MINISTRY OF HEALTH AND SPORTS
THE REPUBLIC OF THE UNION OF MYANMAR

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR IMPROVEMENT
OF
MAGWAY GENERAL HOSPITAL
AND
DAWEI GENERAL HOSPITAL
IN
THE REPUBLIC OF THE UNION OF MYANMAR

[DAWEI GENERAL HOSPITAL]

OCTOBER 2017

JAPAN INTERNATIONAL COOPERATION AGENCY

YAMASHITA SEKKEI INC.
BINKO INTERNATIONAL LTD.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to the consortium of Yamashita Sekkei Inc. and Binko International Ltd.

The survey team held a series of discussions with the officials concerned of the Government of the Republic of the Union of Myanmar, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Union of Myanmar for their close cooperation extended to the survey team.

October, 2017

Ms. Mitsuko Kumagai
Director General
Human Development Department
Japan International Cooperation Agency

SUMMARY

1. Outline of the Recipient Country

The Republic of the Union of Myanmar (Myanmar) is located along the western side of the Indochina Peninsula, and is bordered by the People's Republic of China to the north east, by Laos to the east, Thailand to the southeast, Bangladesh to the west and India to the northwest. The land area is approximately 680,000 square kilometers (about 1.8 times the size of Japan) and the population is about 51.48 million (as of 2014, Census by the Ministry of Labour, Immigration and Population, Government of Myanmar).

The Administrative divisions of Myanmar comprise seven states and seven regions. The Project sites are located in the Magway Region and the Tanintharyi Region, situated at the center and in the southern edge of the country respectively.

Most of the land of Myanmar is in the tropical or subtropical zone, but as the land extends in a narrow strip north to south with highland areas, there are typically large differences in climate depending on the location. A year is generally divided into the dry season from late October to May, in which temperature from April to May is high, and the rainy season from June to mid-October.

Since the transition to civilian government headed by H.E. Mr. Thein Sein in March, 2011, policies to open its economy have been implemented. Its multiple exchange rate system was abolished with unification of foreign exchange markets, then managed floating exchange rate system was introduced in April, 2012. In March, 2016, NLD government headed by H.E. Ms. Aung San Suu Kyi has been inaugurated, then increasing democratization and economic growth are expected for Myanmar. The nominal GDP in 2015 was 66.9 billion USD and the nominal GDP per capita in 2015 was 1,292 USD. The annual growth rate is 9.6 % in April, 2016 as a result of the growth of service and manufacturing industries. Stable annual economic growth of 7 % is assumed in a medium and long term with plenty natural resources, relatively inexpensive labor force, and geopolitical advantage as a node of the member counties of ASEAN (The Associated of Southeast Asian Nations), India and China. Moreover, it is expected that the ASEAN Economic Community, in which Myanmar has participated established at the end of December, 2015 will accelerate economic integration among all member countries.

2. Background and Outline of the Project

Health sector in the Republic of the Union of Myanmar (Myanmar), maternal and child health (MCH) still needs to be improved whilst the recent surge of economic growth has changed the diseases patterns and increased non-communicable diseases (NCDs) related to lifestyle changes. In 2014, the under-five mortality rate (U5MR) was 72 per 1,000 live births, and the maternal mortality ratio (MMR) was 282 per 100,000 live births[1]. The Ministry of Health and Sports (MoHS) has been improving facilities, allocating necessary medical personnel and medical materials, and capacity building for better medical services at the hospitals in accordance with Myanmar Health Vision 2030 and the National Health Plan (2017-2021).

In Myanmar, the hospital system is comprised of three levels: national hospitals; state/regional general hospitals; and district, township and station hospitals. State/regional general hospitals are expected to play

[1] 2014, Population and Housing Census, Department of Population, Ministry of Immigration and Population

a key role in regional medical services by receiving patients referred from district and lower-level hospitals and training medical professionals, such as physicians, nurses, and medical students, at the regional level. However, for many of the state/regional general hospitals, it is difficult to provide necessary medical services due to deterioration of facilities and equipment. In case a patient's needed treatment is not available in a state/regional general hospital, the patient has to be referred to a tertiary hospital out of the state/region, which imposes a substantial physical and economic burden on the patient. Thus, in Myanmar, there are urgent needs to strengthen the medical services at state/regional general hospitals.

To this end, in 2015 Japan International Cooperation Agency (JICA) conducted *Data Collection Survey for State/Regional Hub Hospitals in Myanmar*. Based on the result of the Survey, two medical institutions, Magway General Hospital (MgGH) in the Magway Region and Dawei General Hospital (DGH) in the Tanintharyi Region, were selected as priority target hospitals. The selection of two hospitals was based not only on their needs for assistance to tackle the difficulties in providing proper medical services, but also availability of other resources such as land for the construction of new buildings, and others were confirmed.

DGH, a regional medical center in the Tanintharyi Region, situated in the most southern part of the country, is located within 20km of the Dawei Special Economic Zone (SEZ). Dawei SEZ is expected to be developed into the largest industrial complex in Southeast Asia, and DGH is assumed to provide medical services to the SEZ and surrounding residential areas. As its population is expected to increase significantly in the future, quantitative and qualitative improvement of medical services of DGH is required in the area. Nevertheless, medical services such as examinations, diagnosis and operations in DGH are limited due to deterioration and malfunction of facilities and equipment and are not sufficient for the increasing number of patients. Some cases of surgical operations cannot be performed in the hospital.

In 2016, DGH's average number of outpatients per day was 233, it is 2.74 times higher than the number in 2013 (85 patients a day). The average number of inpatients per day in 2016 was 292, it is 1.51 times higher than the number in 2013 (194 patients a day). The number of operations in 2016 also increased to 4,354 cases, it is1.6 times more cases than in 2013 (2,723 cases).

Moreover, the flow of patients and staff has not been optimized in the existing facilities, which impedes provision of appropriate medical services, and they have been taking more time during transporting emergency patients in the hospital.

Under these circumstances, the Project aims to enhance the medical services of DGH as a regional medical center in the Tanintharyi Region by improving facilities and equipment for providing better medical services in the area, and it further aims to contribute to improvement of health services and people's wellbeing, which would contribute to realization of the aforementioned health policies in Myanmar.

3. Summary of the Survey Results and Components of the Project

(1) Selection of Clinical Departments

In consideration of the above stated background, JICA dispatched a preparatory survey team to Myanmar for the Project from January 2016 to July 2017. Through a series of discussions, it was resolved that the Project would consist of a new building consisting of an operation theater complex, a physiology department, a diagnostic imaging department and a laboratory, etc., and equipment necessary for medical

services in the new building. It was also concluded among MoHS, Thailand International Corporation Agency (TICA) and JICA that the emergency building of DGH would be improved by TICA and be designated to harmonize with the new building under the Project.

1) Outpatient Department

In DGH, the department of medicine, pediatrics, obstetrics / gynecology, surgery, orthopedic, eye, ear-nose-throat (ENT), and psychiatry provide both ambulatory care service and inpatient care service, whilst the departments of dental and dermatology provide only ambulatory care service.

Currently the outpatient department and emergency unit are housed in the same building as a first contact for the patients when they visit the hospital. In this sense, that building is always crowded with both emergency and non-emergency patients, causing delays in treating the emergency patients who should be prioritized.

Furthermore, the building only has three specialty outpatient rooms namely; medicine, pediatrics, and obstetrics/gynecology. However, patients requiring diagnosis and treatment from other specialties have to move by themselves to the respective departments located in other buildings.

Considering that triage will be an essential function of the emergency building provided by TICA and the patients are send to relevant specialties, it is rational to locate an integrated outpatient department near the emergency building for better circulation of patients and medical staff .

2) Diagnostic Imaging Department

Currently, general X-ray machine and ultrasound scanner are located in the pediatrics, medicine and orthopedic ward. A CT scanner is in a separate building. These diagnostic imaging equipment are located away from the outpatient department and the emergency unit. It is a burden on patients and hinders swift diagnostic imaging. Also, the general X-ray machine is old and the rooms don't have proper radiation protection. In order to improve the current situation, the integrated diagnosis imaging department should be located adjacent to emergency building provided by TICA.

3) Operation Theater Complex

Currently, the surgical ward has a total of four operation theaters, i.e., two major operation theaters, one minor operation theater and one infectious operation theater. These operation theaters are used by surgical, orthopedic, obstetrics/gynecology and ENT departments. The eye department next to the surgical ward has two operation theaters, hence DGH has a total of six operation theaters. These operation theaters are located on the first floor of a building away from the building which currently houses the emergency department. There is no elevator in the current operation theater complex. Also, ramp from the ground floor to first floor is away from the operation theaters. It has been a burden for patients and hospital staff.

The existing operation theaters are air-conditioned, however, the air cleanliness of operating field is not controlled. Therefore, they are not suitable for advanced surgical procedures, which require clean environment such as cardiology and cerebrovascular. These difficult cases have been increasing in recent years.

Therefore, for swift patient transfer to the operation theaters, it is necessary to plan operation theater complex with clean environment close to the TICA funded emergency building.

4) Other Relevant Department

The Project plans an ICU with six beds, equal to the number of the operation theaters. One ICU room is for infection control. Also planned is a central sterile supply department which will handle sterilization work not only for operation theaters in the new building, but for the whole hospital. Furthermore, the Project will include a laboratory unit for biochemistry examination which is necessary for diagnostic work in the outpatient department, and hematology (blood) issues and pathological examination, which are essential functions for the emergency unit and/or the operation theaters. Moreover, an endoscopic department will be included in the Project for the diagnoses of rising trends of gastroenteritis, gastric ulcer, colon cancer and lung cancer.

(2) Equipment Plan

The Myanmar side requested to select the medical equipment for the departments to be upgraded under the Project based on “Standard Equipment List for 200 bedded Hospital” and “Hospital Upgrading Project, Curative Service 2009”. The new building under the Project will house the central diagnostic functions with the operation theater complex, diagnosis imaging department, and laboratory etc. Considering the new building plan, it was resolved that the equipment for these departments such as CT scanner, operation lamp, and etc. would be procured under the Project. The other equipment necessary for the running of the new building will either be transferred from existing facilities or procured by the Myanmar side. With this policy, the survey team discussed with the relevant clinical departments of DGH and finalized the requested equipment list agreed upon with the Myanmar side.

The components of the Project are set as shown in Table I below.

Table I：Components of the Project

■Facilities
Main building : 2-story, reinforced concrete structure, 6,090 ㎡
Ancillary buildings : reinforced concrete structure, 310 ㎡（including a generator hut, a blower hut and a ramp）
wooden structure 160 ㎡（connecting corridor）
Total floor area: 6560m^2
Departments
Outpatient department :
Examination, procedure, OPD office, pharmacy storage, medical record etc.
Diagnostic imaging department :
MRI room, CT room, X-ray room, X-TV room, Mammography room, control, interpretation, film store etc.
Laboratory unit :
Biochemistry・hematology・blood issue, microbiology, histopathology, blood collection room etc.
Endoscopy unit :
Upper endoscopy, colonoscopy, examination, recovery, wash room etc.
Operation theater complex :
Operation theater, Operation hall, recovery, anesthetist, doctor office, conference, family waiting, medical engineering office etc.
ICU :
ICU with 6 beds including an isolated bed etc.
Central sterile supply department :
Decontamination, assembling, sterilizing store, CSSD office etc.

■Equipment
Operation lamp, dental unit, ENT unit, fluoroscopy X-ray machine, general X-ray machine, MRI unit, CT scanner, hand scrub station, high pressure steam sterilizer, film viewer, warm cabinet

4. Implementation Schedule and Estimated Cost of the Project

Considering the scale of the new building and local construction conditions, etc., the Project will take approximately 51 months for its implementation including 15.5 months for detailed design and bidding, 20 months for construction works, 9 months for procurement and installation of the equipment and 13.7 months for soft component. The project cost borne by the Government of Myanmar is estimated to be 4,388,074 thousand MMK.

5. Evaluation of the Project

(1) Relevance

The Project is judged relevant as Japanese Grant Aid in light of the following points.

1) Beneficiaries of the Project

There are two secondary hospitals in Tanintharyi Region, one is DGH located in Dawei district and the other in Myeik district. Considering that the catchment area of DGH is northern part of Tanintharyi Region, the number of beneficiaries of the Project are expected to be the whole population in the Dawei district and Palaw township in the Myeik district (587 thousand).

2) Contribution to Human Security

It is expected that the service availability among poor and older people would be improved by enhancing medical services of DGH as a regional medical center. Accordingly, in terms of human security, the Project

could contribute to Basic Human Needs and public welfare.

3) Contribution to Long Term Health Plan in Myanmar

The Project could contribute to the achievement of the goals of the long term health plan "Myanmar Health Vision 2030" whose main goals include the "Improvement of health condition of the people", "Provision of health services to all people" and "Development of medical personnel", etc.

4) Alignment of Policy of Japanese Assistance

The Project coincides with one of important policies of Japanese economic assistance to Republic of the Union of Myanmar (April 2012); "Assistance to improvement of people's life (e.g. healthcare improvement, disaster prevention, assistance to the minority and the poor, agriculture development and regional development). Also as the ninth pillar of Japan-Myanmar Cooperation Program (November, 2016), improvement of health services in states/regions is listed in the item: "Improvement of the health sector which is directly linked to people's lives". Therefore, the Project is consistent with this direction of Japanese cooperation to Myanmar.

(2) Effectiveness

Expected effects of the Project are as follows;

1) Quantitative Effects

Quantitative indicators of which the actual numbers are available as a statistical data at the stage of preparatory survey are shown in Table II. Those indicators were selected to confirm the effectiveness of the Project by improving the facilities and equipment.

Table II：Quantitative Indicators and Target Values

Indicators	Baseline（as of 2016）(case)	Target value (in 2024) three years after project completion (case)
The annual No. of examinations with CT procured under the Project	993	1,590
The annual No. of MRI examinations	There is no baseline	427
The annual No. of surgical operations	4,354	5,878

(3) Qualitative Effects

Expected qualitative effects of the Project are shown in Table III. A questionnaire survey to medical personnel and medical students at DGH after completion of the Project will be conducted for the confirmation of the effects. Respondents, who would have been working for DGH before the Project, will be requested to answer comparing conditions of DGH before and after the Project. Other respondents, who would be deployed to work at DGH after the Project, will be requested to answer comparing the hospital with other similar hospitals where they worked.

Table III： Qualitative Effects

1. Emergency patients get effective treatment through improved patient and staff flow including swift patient transfer to the new CT room and operation theater complex.
2. Operations in the clean environment are performed with the operation theater complex.
3. Diagnostic capacity at DGH is enhanced through the improvement of medical and health care services.
4. Clinical practice environment is improved at DGH through equipment and building construction.
5. The health indicators (MMR, U5MR, and IMR) in Tanintharyi region show an improving trend.

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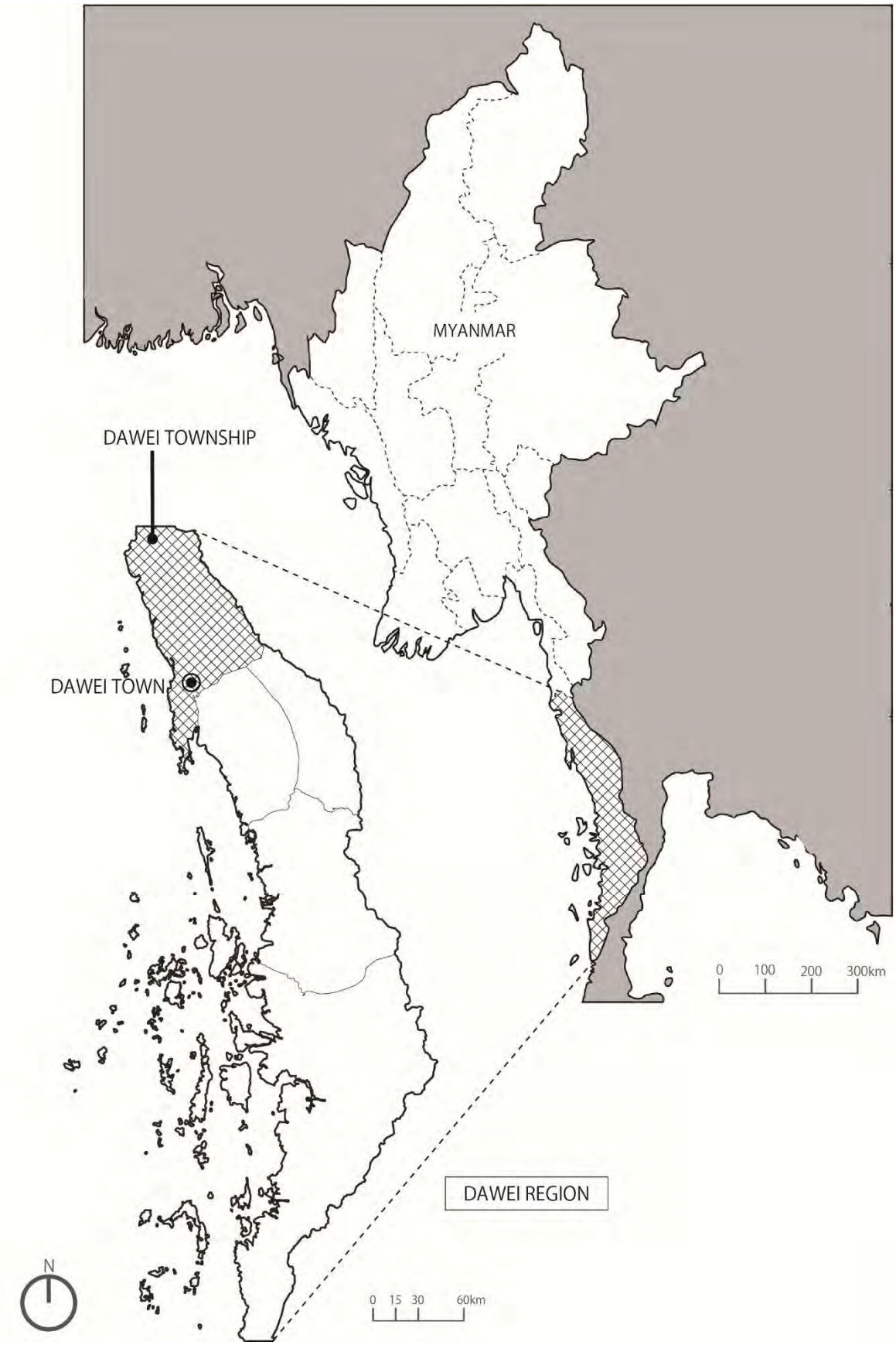
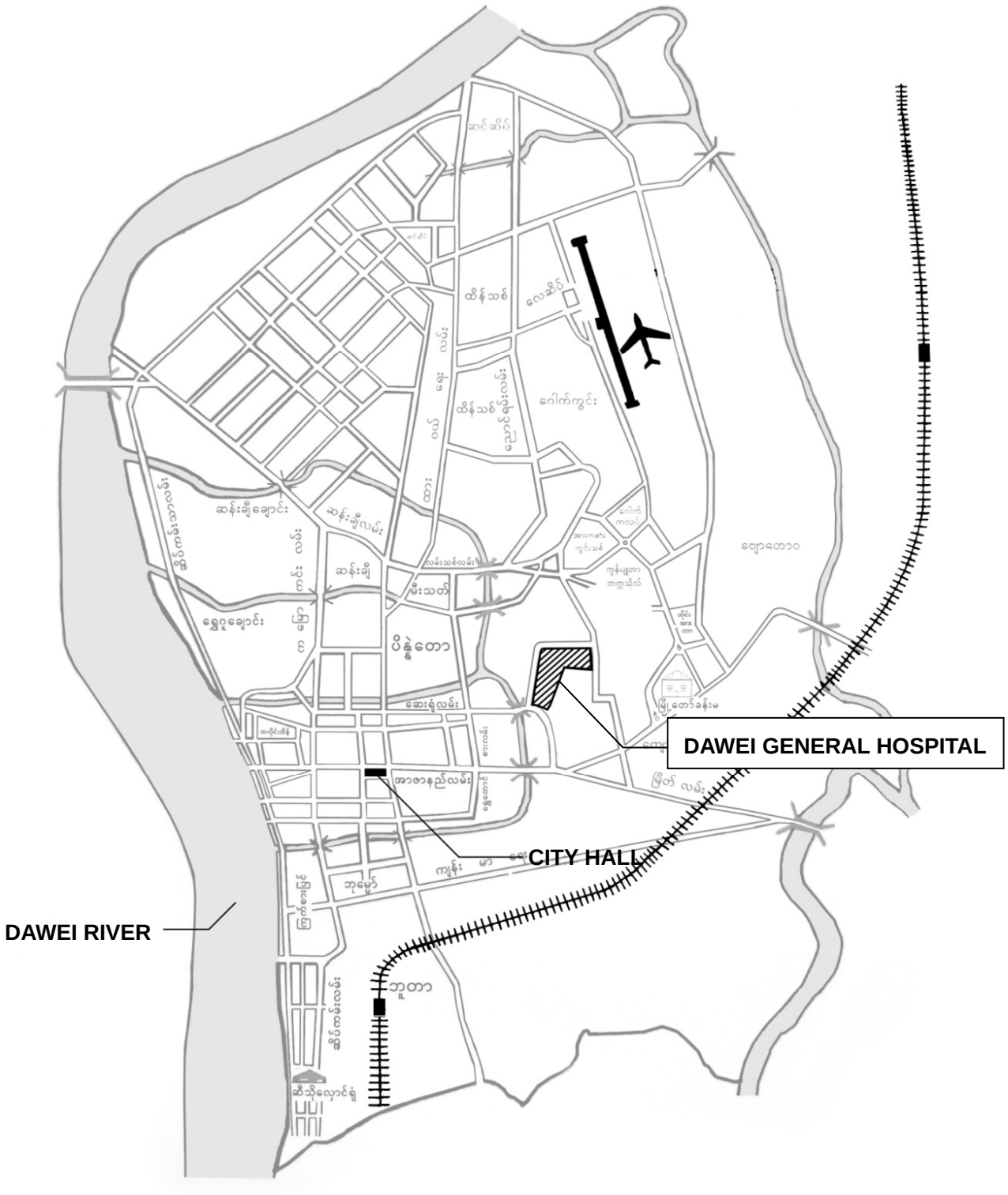


Figure-I Map of Myanmar



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PERSPECTIVE

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ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ASTM	American Society for Testing and Materials
AVR	Automatic Voltage Regulator
BS	British Standards
CMSD	Central Medical Stores Department
CPAP	Continuous Positive Airway Pressure
CT	Computed Tomography
DGH	Dawei General Hospital
E/N	Exchange of Notes
EIA	Environmental Inpact Assessment
ELISA	Enzyme-Linked Immunosorbent Assay
EMP	Environmental Management Plan
$EtCO_2$	End Tidal CO_2
G/A	Grant Agreement
HA	Health Assistant
HDU	High Dependency Unit
HEPA	High Efficiency Particulate Air
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
IEE	Initial Environmental Examination
IMF	International Monetary Fund
ISO	International Organization for Standardization
JIS	Japanese Industrial Standards
LAN	Local Area Network
LED	Light Emitting Diode
M/D	Minutes of Discussion
MgGH	Magway General Hospital
MMK	Myanmar Kyat
MoECAF	Ministry of Environmenal Conservation and Forestry
MoHS	Ministry of Health and Sports
MRI	Magnetic Resonance Imaging
P/Q	Prequalification
PBX	Private Branch eXchange
RC	Reinforced Concrete
TICA	Thailand International Cooperation Agency
UPS	Uninterruptible Power Supply
USD	US Dollar

Chapter 1 Background of the Project

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1-1 Background of the Project

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In Myanmar, the hospital system is comprised of three levels: national hospitals; state/regional general hospitals; and district, township and station hospitals. State/regional general hospitals are expected to play a key role in regional medical services by receiving patients referred from district and lower-level hospitals and training medical professionals, such as physicians, nurses, and medical students, at the regional level. However, for many of the state/regional general hospitals, it is difficult to provide necessary medical services due to deterioration of facilities and equipment. In case a patient's needed treatment is not available in a state/regional general hospital, the patient has to be referred to a tertiary hospital out of the state/region, which imposes a substantial physical and economic burden on the patient. Thus, in Myanmar, there are urgent needs to strengthen the medical services at state/regional general hospitals.

To this end, in 2015 Japan International Cooperation Agency (JICA) conducted *Data Collection Survey for State/Regional Hub Hospitals in Myanmar*. Based on the result of the Survey, two medical institutions, Magway General Hospital (MgGH) in the Magway Region and Dawei General Hospital (DGH) in the Tanintharyi Region, were selected as priority target hospitals. The selection of two hospitals was based not only on their needs for assistance to tackle the difficulties in providing proper medical services, but also availability of other resources such as land for the construction of new buildings, and others were confirmed.

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1-2 Natural Conditions

(1) Topography

Dawei town is the capital of the Tanintharyi Region located at the south most part of Myanmar. The Andaman Sea stretches on the west side while mountains surrounds on the north, east and south sides. It is close to the border with Thailand, which is beyond the eastern mountains.

(2) Geology

The surface layer is a reddish-brown soil, and the lower layer is sandy clay. At depths greater than five meters silty sand layer is observed.

(3) Groundwater

Water source for the Project will be tube well considering the fact that the existing facilities rely mainly on well water. In this connection, during the Preparatory Survey groundwater survey was conducted with test well analysis. According to the result of the survey, static water level in the test well, whose diameter was 0.15 meter and depth was approximately 37.5 meters, was 4.6 meter in depth. Its discharge rate was assumed 128 liters per minute. Regarding water quality of the test well, pH and iron contents didn't meet WHO drinking water guideline (1993). The result of the major water quality parameters tested are shown in Table 1-1 below.

Table 1-1 Result of the Water Quality Test

Item	Test Well	WHO Drinking Water Guideline (1993)
pH	5.6	6.5－8.5
Color: TUC	0	15
Turbidity: NTU	16	5-25
Total Hardness: mg/L	12	500
Arsenic: mg/L	-	0.01
Iron: mg/L	0.43	0.3
Manganese: mg/L	0	0.05
Chloride(as CL): mg/L	7	250
Sulphate (as SO_4): mg/L	0	200
Total Solids: mg/L	38	1,500

(4) Climate

There is a little rainfall during the dry season, however, there is very high rainfall during the rainy season between May and October. It is the largest rainfall region in Myanmar, and also one of the rainiest region in the world. Table 1-2 shows weather data obtained from the weather stations in Dawei city.

Table 1-2 Meteorological Record in Dawei City

2015		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Temperature (℃)		35.0	36.5	38.0	38.0	36.8	35.0	33.5	33.0	33.7	34.5	35.8	35.6
Minimum Temperature (℃)		12.4	12.5	18.5	16.8	21.5	20.0	22.0	21.5	22.0	20.0	21.0	16.5
Precipitation(mm)		36	0	13	100	487	993	979	1093	774	309	97	27
Relative Humidity(%)		91	95	95	95	97	97	98	98	98	96	94	94
Wind Direction		NW	NW	NW	NW	NW	NW	SW	SW	SW	SW	NE	NE
Rainy Days	1.0mm<	0	0	0	0	0	0	0	0	0	0	0	NA
	1.0mm≧	0	1	5	14	22	31	28	25	15	4	2	1
Wind Velocity(m/s)		7.7	7.7	7.7	10.3	9.3	7.7	7.7	7.7	12.9	7.7	7.7	7.7

・Highest Dry Bulb Temperature : 38.0℃ 15th.April.16
・Loest Dry Bulb Temperature : 12.4℃ 3rd.Jan.16
・Maximum Precipitation : 139mm/day 12th.Sep.15
・Maximum Wind Velocity : 18.0m/s

Source: : meteorological observatory in Dawei City

(5) Natural Disasters

1) Flood

In the low altitude areas near the Dawei River, flooding occurs two to three times each year during the rainy season. However, the damage is limited to a few areas. Also, it is not a major damage to residents. The Dawai meteorological observatory does not keep records of these minor flood cases. The flooding has not occurred around DGH, Hospital Road, it is located in a high altitude area.

2) Cyclone

Dawei is located out of the cyclone route, therefore, no direct damage was recorded.

3) Earthquake

According to the 2012 earthquake zone map of Myanmar, the possible peak ground acceleration estimated at 0.31～0.4m/s2(g) and shakings with intensity of VIII to IX on the Modified Mercalli Intensity Scale can happen.

1-3 Social and Environmental Considerations

(1) Category in “the JICA Guidelines for Environmental and Social Considerations”

The preparatory survey has not raised any concerns about environmental or social impacts in the Project site. The Project should be categorized as C in accordance with “the JICA Guidelines for Environmental and Social Considerations” because it is likely to have minimal or no adverse environmental or social impacts.

(2) Environmental Conservation Law in Myanmar

In Myanmar, the Environmental Conservation Bill was approved by the People’s Assembly and enacted into law in 2015. According to the guidelines on the law, the MoHS must submit their proposals to the Ministry of Natural Resource and Environmental Conservation (MoNREC), which is the competent authority under the law to determine whether MoHS should prepare both Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) reports or to prepare only an IEE report.

After it is determined, MoHS must follow the necessary procedures as specified according to the assessment category. In some cases MoNREC may order elaboration of Environmental Management Plan (EMP) regardless of necessity of IEE and/or EIA. If EMP is planned, MoHS is required to have a third party monitor to assess and report on whether MoHS is implementing the project according to the EMP.

According to the guidelines of the Environmental Conservation Law, at least an IEE report is required for all hospital construction projects, regardless of their size.

Chapter 2 Contents of the Project

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2-1 Basic Concept of the Project

(1) Overall Goals and Project Purpose

In Myanmar, though state/regional general hospitals are expected to play a key role in regional medical services, many hospitals are having difficulties to provide necessary medical services due to the deterioration of facilities and equipment. Therefore, there is an urgent need to strengthen the medical services at state/regional general hospitals.

In this connection, the Ministry of Health and Sports (MoHS) has been improving facilities for better medical services at the hospitals and is allocating necessary medical personnel and medical materials (equipment and medicine, etc.), and conducting trainings for capacity improvement in accordance with Myanmar Health Vision 2030 and the National Health Plan (2017-2021).

DGH, a regional medical center in the Tanintharyi Region, situated in the southernmost part of the country and is situated within 20km of the Dawei Special Economic Zone (SEZ), which is expected to be the largest industrial complex in Southeast Asia. DGH is expected to provide medical services to the SEZ and surrounding residential areas as well. As the population in the area is expected to increase significantly in the future, quantitative and qualitative improvement of medical services of DGH is inevitable. Nevertheless, medical services such as examinations, diagnosis and operations in DGH are limited due to deterioration and malfunction of facilities and equipment and are not sufficient for the increasing number of patients. Some surgical operation cases cannot be performed in the hospital. At DGH, the average number of outpatients per day was 233 in 2016, almost tripled than that of 2013 (85). The average number of inpatients per day in 2016 was 292, it is1.51 times higher than that of 2013 (194 patients a day). The number of operations increased 1.6 times to 4,354 cases in 2016 from 2,723 cases in 2013. Moreover, flows of patients and staff have not been optimized in the existing facilities, therefore, it impedes provision of appropriate medical services, such as prompt transportation of emergency patients in the hospital.

Under these circumstances, the Project aims to enhance the medical services of DGH as a regional medical center in the Tanintharyi Region by improving facilities and equipment for providing better medical services, in the area, and it further aims to contribute to improvement of health services and people’s wellbeing, which would contribute to realization of the aforementioned health policies in Myanmar.

(2) Basic Concept of the Project

To achieve the project purpose, the Project will construct a new building consisting of an operation theater complex, a physiology department, a diagnostic imaging department and a laboratory, etc. in the existing premises of DGH. The Project will also provide equipment required for medical services in the new building.

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Basic Policy

Considering the above stated background, JICA dispatched a preparatory survey team to Myanmar for the Project from January 2016 to July 2017. Through a series of discussions, it was resolved that the implementation of this hospital development project be based on the following principles:

- Universal design of facilities to provide patient-oriented medical services;
- Facility design based on a future development plan;
- Favorable educational environment provided to medical personnel including hospital staff and medical students; and
- Facility design for disaster risk reduction.

The Project site will be selected considering size and position which will improve functions of DGH as a whole in accordance with these principles. The medical equipment will be selected focusing on the equipment necessary for the medical services in the new building.

2-2-1-2 Policy for Natural Conditions

(1) Consideration for High Temperature and Solar Radiation

In Dawei Region, the maximum temperature ranges from 33 to 38 degree Celsius throughout the year; therefore, the new building to be constructed will be designed to control strong sunlight, the main external heat load.

Specifically, a roofed corridor will be constructed along perimeter of the new building and walls as well as installation of sunscreens where necessary to control direct sunlight. In addition, insulation will be installed on the roof to reduce heat load from the roof.

(2) Consideration for Rainfall

Considering extremely high rainfall of about 1,000 mm/month in the rainy season from June to August, drainage plan will be important. The Project site will be elevated and drainage gutters will be constructed around the new building for fluent discharge of rainwater.

2-2-1-3 Policy for Socioeconomic Conditions

In Myanmar, many informal caregivers, most of whom are family members of inpatients, generally take care of the inpatient’s needs other than medical services, such as changing sheets and preparing meals. They usually stay overnight in hospital halls and hallways. In light of this local custom, necessary areas for these caregivers will be secured in the new building.

2-2-1-4 Policy on Construction Conditions and Procurement Conditions

(1) Policy on Construction Conditions

Since building standards and relevant regulations are still being developed and not yet enforced in Myanmar, the new building of the Project will be designed in compliance with a draft version of these standards and regulations or in reference to relevant laws and regulations of Japan. Moreover, since

construction works require advance acquisition of a building permit from the Dawei Region Development Committee, it was resolved during the preparatory survey that the activity would be done promptly by the Myanmar side.

(2) Policy on Procurement Conditions

Almost all of the major construction materials are available on the local market and they are either locally produced or imported from China and/or ASEAN countries. It is possible to obtain construction materials that meet the quality requirements of the construction works of the Project. Therefore, construction materials for the construction works of the Project will in principle be procured from the local market.

The medical equipment will be procured in Myanmar or from Japan based on the principles of Japanese Grant Aid. Procurement from third countries will be considered in case that competitive bidding is not expected.

2-2-1-5 Policy on Use of Local Contractors

Local contractors undertake most of the public and private construction works. They also participate in projects funded by international donors and agencies including the Government of Japan. Therefore, it is possible to find local construction firms that meet the quality requirements of the construction works of the Project. In this sense, the new building of the Project in principal will adopt structural designs that are common in Myanmar as well as finishing materials and building equipment that have already been introduced to the country, to enable local construction firms to participate in the construction works.

2-2-1-6 Policy on Operation and Maintenance

In light of the current facility management at DGH, it was judged that the new building of the Project should not include building equipment or systems which are not commonly used in Myanmar and which require advanced maintenance techniques. Moreover, building equipment requiring daily maintenance should be carefully selected according to the availability of consumables and spare parts so that it will not cause undue financial burden to DGH.

As for the medical equipment, it will be selected on condition that the engineers from local agents can provide maintenance services of the equipment. The soft component program to enhance the utilization and maintenance capability of diagnostic imaging equipment of the Project will be conducted.

2-2-1-7 Policy on Grade Setting for Facilities and Equipment

In principle, the grade of facilities will be set considering mainly the easiness of maintenance and the durability of medical facilities. This decision will be made by referring to similar cases as well as other hospitals constructed in cooperation with Japan in Myanmar.

In regard to the grade of medical equipment, it will be determined based on functions meeting the required medical services and operation status of similar equipment in medical facilities. Also, latest models available during the project design phase will be selected in light of frequent model changes of medical equipment and a time-lag between the design phase and the implementation phase, to ensure longer equipment life cycle in the operation phase.

2-2-1-8 Policy on Construction Schedule

The construction schedule will be set by taking into consideration the local conditions, such as availability of workers in provincial areas and delays in construction works during the rainy season. Furthermore, the construction time will be estimated assuming that there will be a need for pile foundation works to cope with soft ground in the Project site.

2-2-2 Basic Plan (Construction Plan/Equipment Plan)

2-2-2-1 Examination of Components of the Project

(1) Future Development Plan

1) Current Conditions

As DGH is assumed to provide medical services to the Dawei Special Economic Zone and surrounding residential areas, quantitative and qualitative improvement of its medical services is deemed necessary. In 2016, the MoHS decided to increase the number of sanctioned beds in DGH from 200[1] to 500, and add specialized clinical departments according to the current disease trends. Under these circumstances, it is important for DGH to enhance its functions and secure adequate environment for medical services so that they can diagnose ischemic heart diseases, cerebrovascular diseases, and other non-communicable diseases that are increasing, as well as responding to the increase of patients due to the increased number of beds.

There have been extension and reconstruction of facilities since the establishment of DGH. However, as circulations of patients and medical staff have not been improved, a substantial burden is imposed on their movements. The inefficient layout of the existing buildings makes it impossible to optimize circulations of emergency patients, outpatients and of postoperative patients. In the current layout, the diagnostic imaging department is located far from the emergency department, making it difficult to secure efficient circulations of outpatients for emergency CT scanning, general imaging, and ultrasonic examinations. (See Figure 2-1)

As a secondary care hospital, it is important to improve the emergency department and operation theater complex for appropriate treatment of emergency patients as well as consolidating the physiology department, the diagnostic department and the laboratory used by both outpatients and inpatients. Moreover, DGH's facilities and equipment in these departments are old and the personnel encounter problems when providing medical services. In this connection, the Project should improve these departments. With regards to the emergency department, the government of Thailand has started cooperation with the department[2], which the Project will harmonize.

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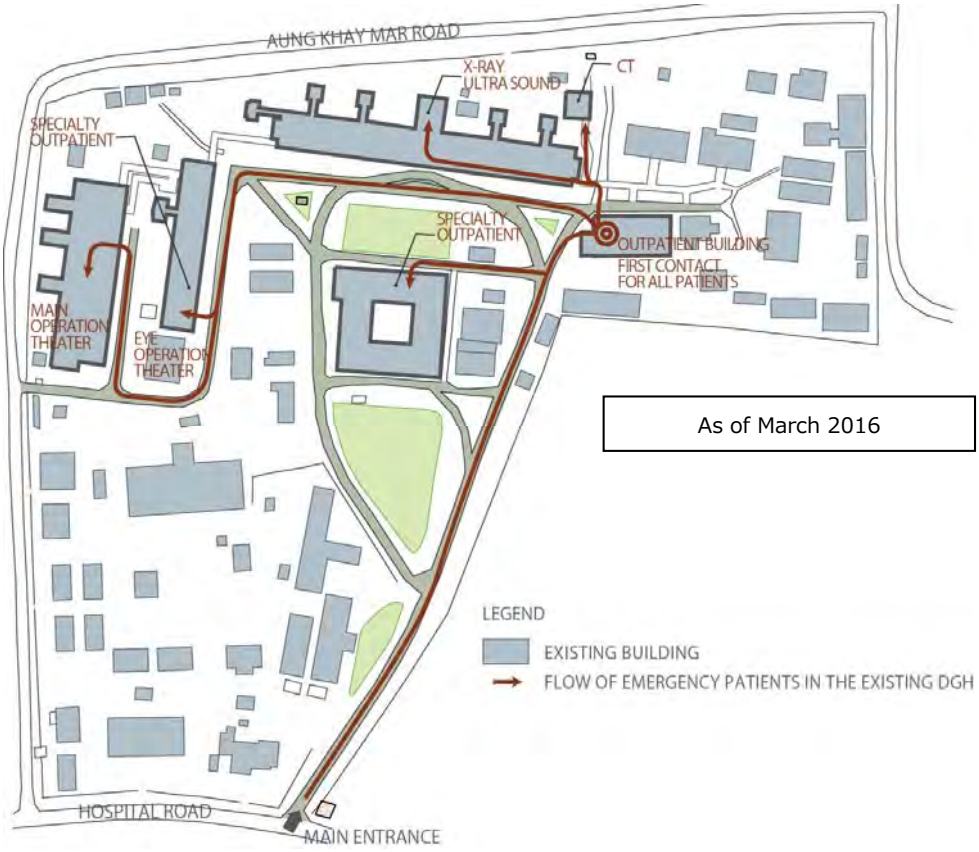
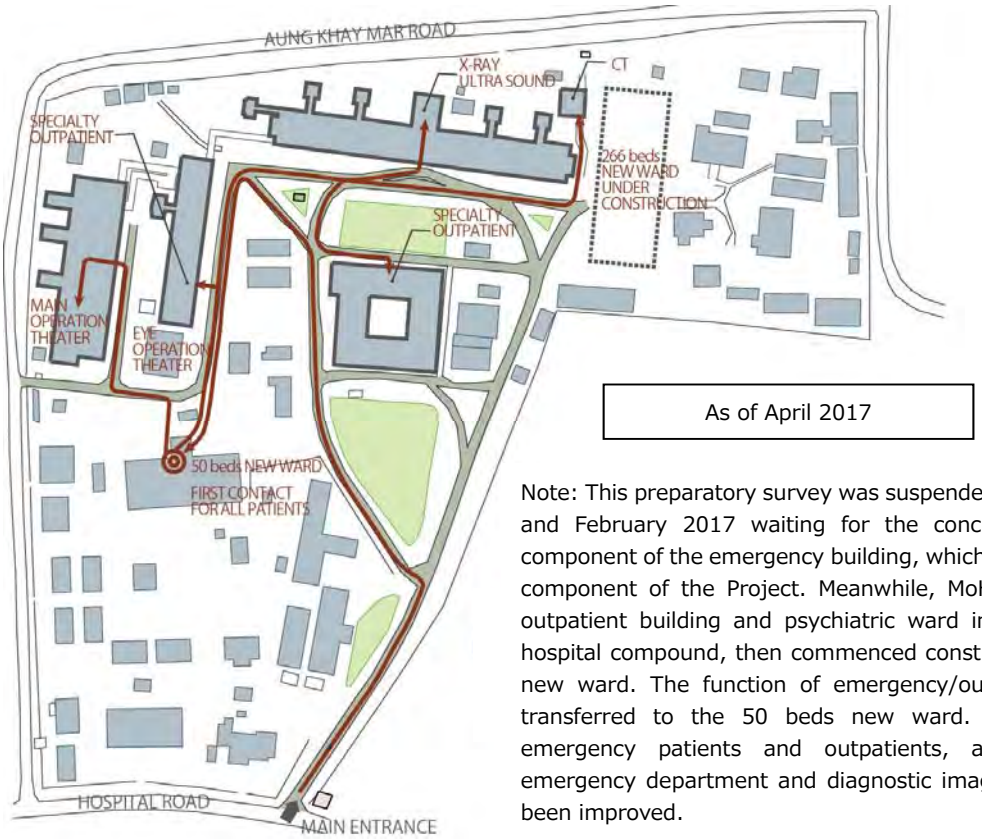
[1] Although the number of sanctioned beds is 200, the actual number of operational beds is 370 as of 2016.

[2] Project title is "The Development of Emergency Department at Dawei General Hospital Project". Training courses for medical professionals of DGH were provided since 2015, which will be followed by construction of an emergency building and provision of medical equipment.





Note: This preparatory survey was suspended between August 2016 and February 2017 waiting for the conclusion of the Thailand component of the emergency building, which might be related to the component of the Project. Meanwhile, MoHS demolished existing outpatient building and psychiatric ward in northern area of the hospital compound, then commenced construction of the 266 beds new ward. The function of emergency/outpatient department is transferred to the 50 beds new ward. Clinical circulation for emergency patients and outpatients, and distance between emergency department and diagnostic imaging department hasn't been improved.

Figure 2-1 Circulation of Patients in the Existing Conditions

2) Harmonization with Emergency Building provided by Thailand

Since 2015, the government of Thailand has been providing support to DGH for emergency medical services and has a plan to develop the emergency building. MoHS, Thailand International Corporation Agency (TICA) and JICA discussed at DGH on 2nd of April, 2017. Then, three parties resolved that the new building under the Project will be harmonized with the emergency building provided by TICA, comprising the central diagnostic functions[3] of DGH.

3) Future Development Plan

In January 2016, the future development plan of DGH was concluded as shown in Figure 2-2. Then, this preparatory survey was suspended between August 2016 and February 2017, waiting for the conclusion of the component of the emergency building provided by TICA. When the survey team visit DGH in April 2017, after the resumption of preparatory survey, they found that the new ward was being constructed at a location different from the future development plan concluded in January 2016. (From A to B in Figure 2-2), and it was confirmed that the new ward under construction is a five story building with 266 beds, consisting of ENT/eye ward, surgical ward, obstetrics/gynecology ward, pediatrics ward, and internal medicine ward. In response to this change, the functional zoning of DGH was revised as shown in Figure 2-3 with the following basic concepts;

- To consolidate central diagnostic functions, the Japanese side will construct the new building next to the emergency building funded by TICA located in the middle of the DGH compound. It will consist of the outpatient department, diagnostic imaging department, laboratory unit, endoscopy unit, operation theater complex, ICU, and central sterile supply department.
- Two connecting corridors from the new building to the 50 beds new ward and the 266 beds new ward will be constructed by Myanmar side. When delivery unit and neonatal unit are improved by the Myanmar side and connected to the central diagnostic functions with a corridor, currently dispersed functions will be consolidated in the middle of the site and medical services will be carried out more efficiently.
- Pediatrics, internal medicine and orthopedic ward building were constructed when DGH was founded.

[3] Generally, Central Diagnostic Functions mean examination and treatment functions of a hospital

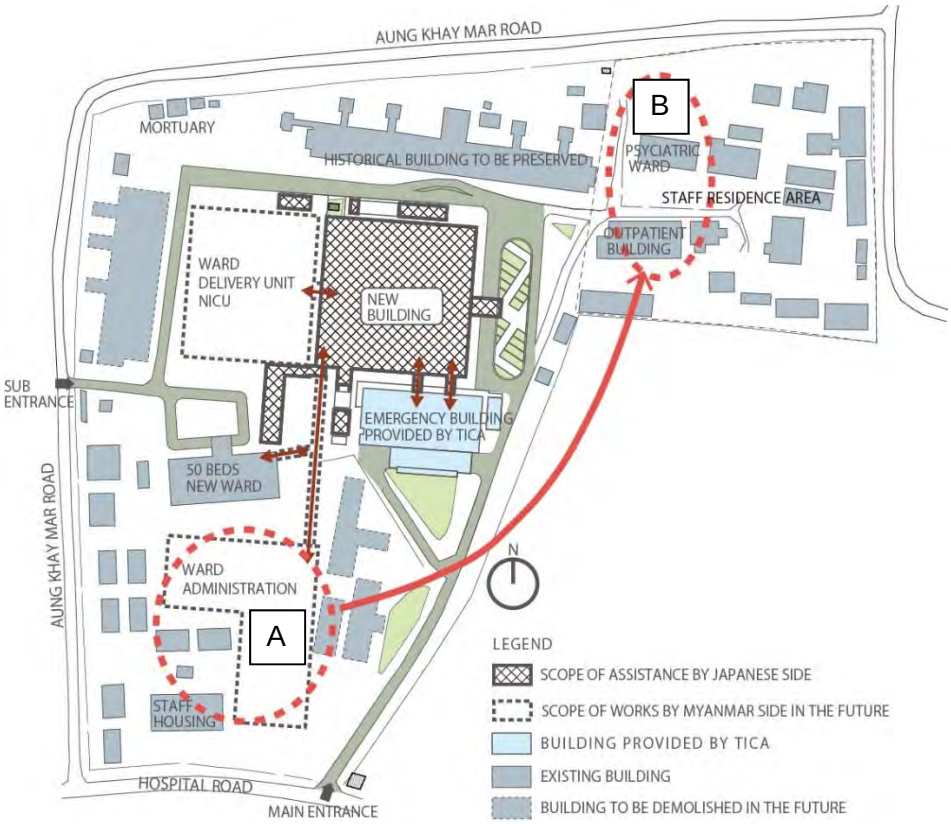


Figure 2-2 Revision of Future Development Plan of DGH

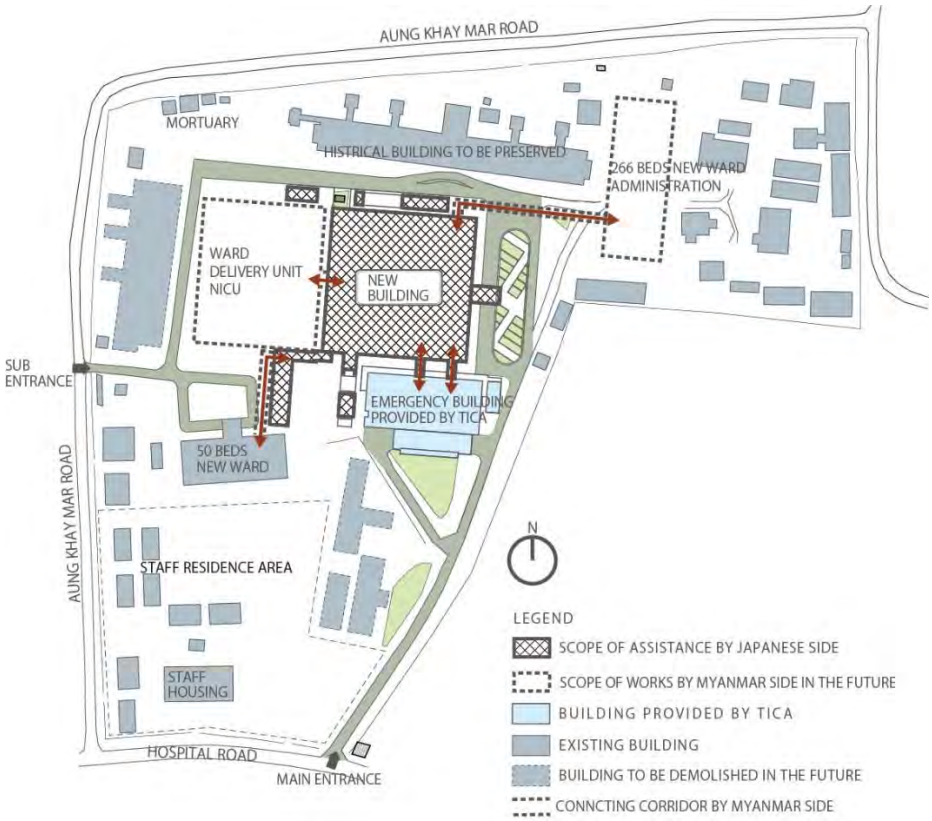


Figure 2-3 Future Development Plan of DGH

(2) Selection of Clinical Departments

1) Outpatient Department

A) Current Conditions

In DGH, the departments of medicine, pediatrics, obstetrics/gynecology, surgery, orthopedic, eye, ear-nose-throat (ENT), and psychiatry provide both ambulatory care service and inpatient care service, whilst the departments of dental and dermatology provide only ambulatory care service.

Currently the outpatient department and emergency unit are housed in the 50 beds new ward[4], therefore the 50 beds new ward is the first contact for the patients when they visit the hospital. In this sense, the 50 beds new ward is always crowded with both emergency and non-emergency patients, causing delays in treating the emergency patients who should be prioritized.

The 50 beds new ward has three specialty outpatient rooms namely; medicine, pediatrics, and obstetrics/gynecology. However, patients requiring diagnosis and treatment from other specialties have to move by themselves to the respective departments located in other buildings.

Considering that triage will be an essential function of the emergency building provided by TICA and the patients are send to relevant specialties, it is rational to locate an integrated outpatient department near the emergency building for better circulation of patients and medical staff .

B) Size of Department

Table 2-1 shows the existing and planned number of consultation, procedure and examination rooms. Taking into consideration the existing condition of outpatient rooms in each department, necessary number and types of rooms are decided upon in order for DGH to function as a secondary care hospital.

[4] In 2016 survey, the reception for all outpatients was in the outpatient building. After that, it was demolished for construction of the 266 beds new ward. Then, the reception for all outpatients was relocated to the 50 beds new ward.

Table 2-1 Planned Number of Rooms in Outpatient Department

Specialty	Existing No. of consultation rooms	Planned No. of consultation rooms	Note
Medicine	2 consultation rooms	2 consultation rooms	Same as the existing
Surgery	1 consultation rooms (Used as two rooms with partitions)	2 consultation rooms	Same as the existing
Obstetrics/Gynecology	1 consultation room	2 consultation rooms (each for Obstetrics and Gynecology)	Separated rooms for Obstetrics and Gynecology respectively
Orthopedic	1 consultation room (in the ward)	1 consultation room & 1 procedure room	A procedure room to be shared with Surgery
Pediatrics	1 consultation room	2 consultation rooms	1room increased from the existing no. of rooms[5]
Dental	1 consultation room	1 consultation room & 1 procedure room	1 room to be added for dental unit
Psychiatric	1 consultation room (in the ward)	1 consultation room	Same as the existing
Dermatology	1 consultation room & 1 procedure room	1 consultation room & 1 procedure room	Same as the existing
Eye	1 consultation room (in the ward)	1 consultation room & 1 examination room	1 room to be added for examination
ENT	1 consultation room (in the ward)	1 consultation room & 1 examination room	1 room to be added for examination
Total	Consultation rooms:11 (incl. 4 in the wards) Procedure room: 2	Consultation rooms: 14 Procedure rooms: 3 Examination rooms: 2	

Source: DGH hospital profile

2) Diagnostic Imaging Department

A) Current Conditions

Currently, general X-ray machine and ultrasound scanner are located in the pediatrics, medicine and orthopedic ward. A CT scanner is in a separate building. These diagnostic imaging equipment are located away from the 50 beds new ward, the first contact for emergency patients and outpatients. It is a burden on patients and hinders swift diagnostic imaging. Also, the general X-ray machine is old and the rooms don't have proper radiation protection. In order to improve the current situation, the integrated diagnosis imaging department should be located adjacent to emergency building provided by TICA.

B) Size of Department

The diagnostic imaging department will have new equipment such as MRI unit, fluoroscopic X-ray machine, and mammography unit. Also, the Project will upgrade old equipment, such as CT scanner, general X-ray machine. This enable the hospital to provide necessary diagnostic services as a secondary care hospital.

[5] The number of pediatric outpatients was 6,946 in 2015. The number is expected to increase by 1.35 times when the number of actual operational beds will increase from the current number of 370 to 500. Considering that the outpatient service hours are from 9:00 a.m. to 12:00 a.m. and assuming there will be two examination rooms, the number of patients per room per hour will be 6,946 x 1.35/12 (months)/20 (days)/3 (hours)/2 (rooms) = 6.5. Based on the calculation, it is considered appropriate.

Table 2-2 Rooms in Diagnostic Imaging Department

Room	Note
General X-ray room	A new general X-ray machine to be installed by the Japanese side
Fluoroscopy X-ray room	A new fluoroscopy X-ray machine to be installed by the Japanese side
CT Room	A new CT scanner to be installed by the Japanese side
MRI Room	A new MRI to be installed by the Japanese side
Mammography Room	A mammography unit to be installed by the Myanmar side

3) Operation Theater Complex

A) Current Conditions

Currently, the surgical ward has a total of four operation theaters, i.e., two major operation theaters[6], one minor operation theater and one infectious operation theater. These operation theaters are used by surgical, orthopedic, obstetrics/gynecology and ENT departments. The eye department next to the surgical ward has two operation theaters, hence DGH has a total of six operation theaters. These operation theaters are located on the first floor of a building away from the 50 beds new ward, which currently houses the emergency department. There is no elevator in the current operation theater complex. Also, ramp from the ground floor to first floor is away from the operation theaters. It has been a burden for patients and hospital staff.

The existing operation theaters are air-conditioned, however, a positive pressure ventilation is not installed. Therefore, they are not suitable for advanced surgical procedures, which require clean environment such as cardiology and cerebrovascular. These difficult cases have been increasing in recent years.

Therefore, for swift patient transfer to the operation theaters, it is necessary to plan operation theater complex with clean environment close to the TICA funded emergency building.

B) Size of Department

Table 2-3 shows the expected number of operations in the 500 bedded DGH.

Table 2-3 the expected number of operations（500 bedded hospital）

	The number of operations (2016)		The number of expected operations (500 bedded hospital)	
	Major	Minor	Major	Minor
Surgery	850	826	1,148	1,254
Orthopedic	203	286	144	217
Obstetrics/Gynecology	1,196	138	1,674	135
Eye	640	152	731	194
ENT	20	43	38	46
Total	2,909	1,445	4,032	1,846
Total number of operations		4,354		5,878
The number of operations per day （/244 days、except for weekends and national holidays)		17.9		24.1
The number of operations per theater per day		3.6		4.0

Source: DGH hospital profile

[6] Major and minor surgeries are categorized by kinds of surgeries regardless of type of anesthesia (general anesthesia or local anesthesia). For example, in case of Ob/Gy department, Caesarian section operation, laparoscopic surgery etc. are regarded as the major surgeries, while induced abortion etc. are regarded as the minor surgeries.

Although the sanctioned number of beds in DGH is 200, the actual current number of beds is 370. DGH is expected to operate as a 500-bedded hospital, i.e. 1.35 times the current number. Then, if the increase of the operations is proportional to the increase of the beds, the number of operations will be around four per day per operation theatre. Therefore, it is appropriate to plan six operation theatres in the Project.

4) Other related Departments

The Project plans an ICU with six beds, equal to the number of the operation theaters. One ICU bed is isolated for infection control. Also planned is a central sterile supply department which will handle sterilization work not only for operation theaters in the new building, but for the whole hospital. Furthermore, the Project will include a laboratory unit for biochemistry examination which is necessary for diagnostic work in the outpatient department, and hematology (blood) issues and pathological examination, which are essential functions for the emergency unit and/or the operation theaters. Moreover, an endoscopic department will be included in the Project for the diagnoses of rising trends of gastroenteritis, gastric ulcer, colon cancer and lung cancer.

(3) Project Site Selection

The location of the Project site was determined according to the future development plan as indicated in Figure 2-4. The plan will allow the hospital to continue the provision of all its current medical services during construction of the Project.

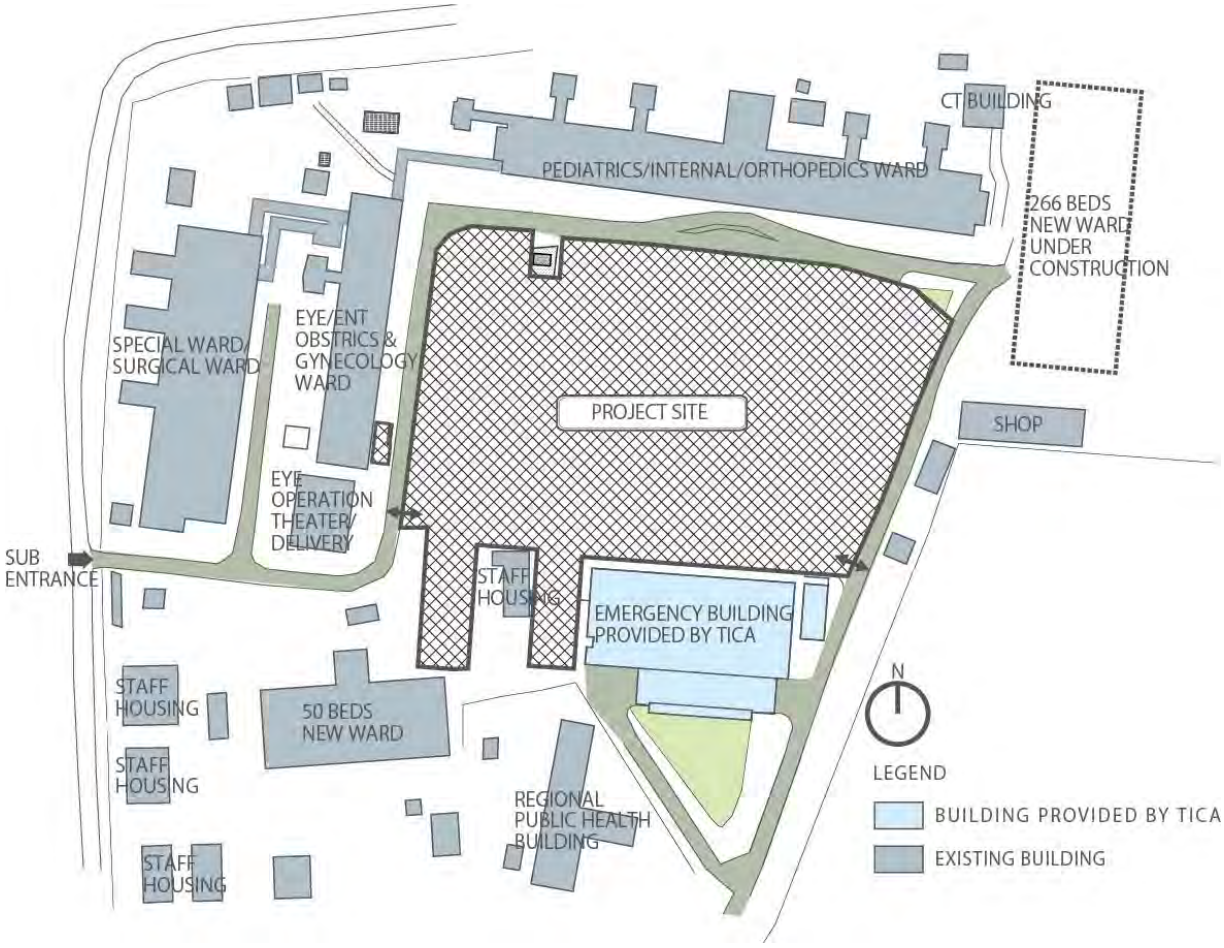


Figure 2-4 the Project Site

(4) Equipment Plan

The Myanmar side requested to select the medical equipment for the departments to be upgraded under the Project based on “Standard Equipment List for 200 bedded Hospital” and “Hospital Upgrading Project, Curative Service 2009”. The new building under the Project will house the central diagnostic functions with the operation theater complex, diagnosis imaging department, and laboratory etc. Considering the new building plan, it was resolved that the equipment for these departments such as CT scanner, operation lamp, and etc. would be procured under the Project. The other equipment necessary for the running of the new building will either be transferred from existing facilities or procured by the Myanmar side. With this policy, the survey team discussed with the relevant clinical departments of DGH and finalized the requested equipment list agreed upon with the Myanmar side.

Based on the above-mentioned analysis, the components of the Project are set as shown in Table 2-4.

Table 2-4 Components of the Project

■Facilities
Main building : 2-story, reinforced concrete structure, 6,090 ㎡
Ancillary buildings : reinforced concrete structure, 310 ㎡（including a generator hut, a blower hut and a ramp)
wooden structure 160 ㎡（connecting corridor)
Total floor area: 6560m^2
Departments
Outpatient department :
Examination, procedure, OPD office, pharmacy storage, medical record etc.
Diagnostic imaging department :
MRI room, CT room, X-ray room, X-TV room, Mammography room, control, interpretation, film store etc.
Laboratory unit :
Biochemistry・hematology・blood issue, microbiology, histopathology, blood collection room etc.
Endoscopy unit :
Upper endoscopy, colonoscopy, examination, recovery, wash room etc.
Operation theater complex :
Operation theater, Operation hall, recovery, anesthetist, doctor office, conference, family waiting, medical engineering office etc.
ICU :
ICU with 6 beds including an isolated bed etc.
Central sterile supply department :
Decontamination, assembling, sterilizing store, CSSD office etc.

■Equipment
Operation lamp, dental unit, ENT unit, fluoroscopy X-ray machine, general X-ray machine, MRI unit, CT scanner, hand scrub station, high pressure steam sterilizer, film viewer, warm cabinet

2-2-2-2 Construction Plan

(1) Site Plan and Floor Plan

1) Access

As shown in Figure 2-5, the main entrance for outpatients and their families will be placed on the east side of the new building. The entrance for emergency patients will be placed on the south side of the new building and connected to emergency building funded by TICA with corridors. Circulations of outpatients and emergency patients will be clearly separated and emergency patients can be transferred quickly through these exclusive use corridors.

A sub entrance will be created on the west side of the new building and a roofed corridor connects it to the ground floor of the existing eye, ENT, obstetrics/gynecology ward. As all the existing buildings are connected with corridors, it will be secured to move from the existing buildings to the new building without getting wet in rain.

Once the Japanese side completes the new building, the Myanmar side will be construct the corridors connecting the new building to the newly completed 50 beds new ward, and to the 266 beds new ward under construction (as of July, 2017).

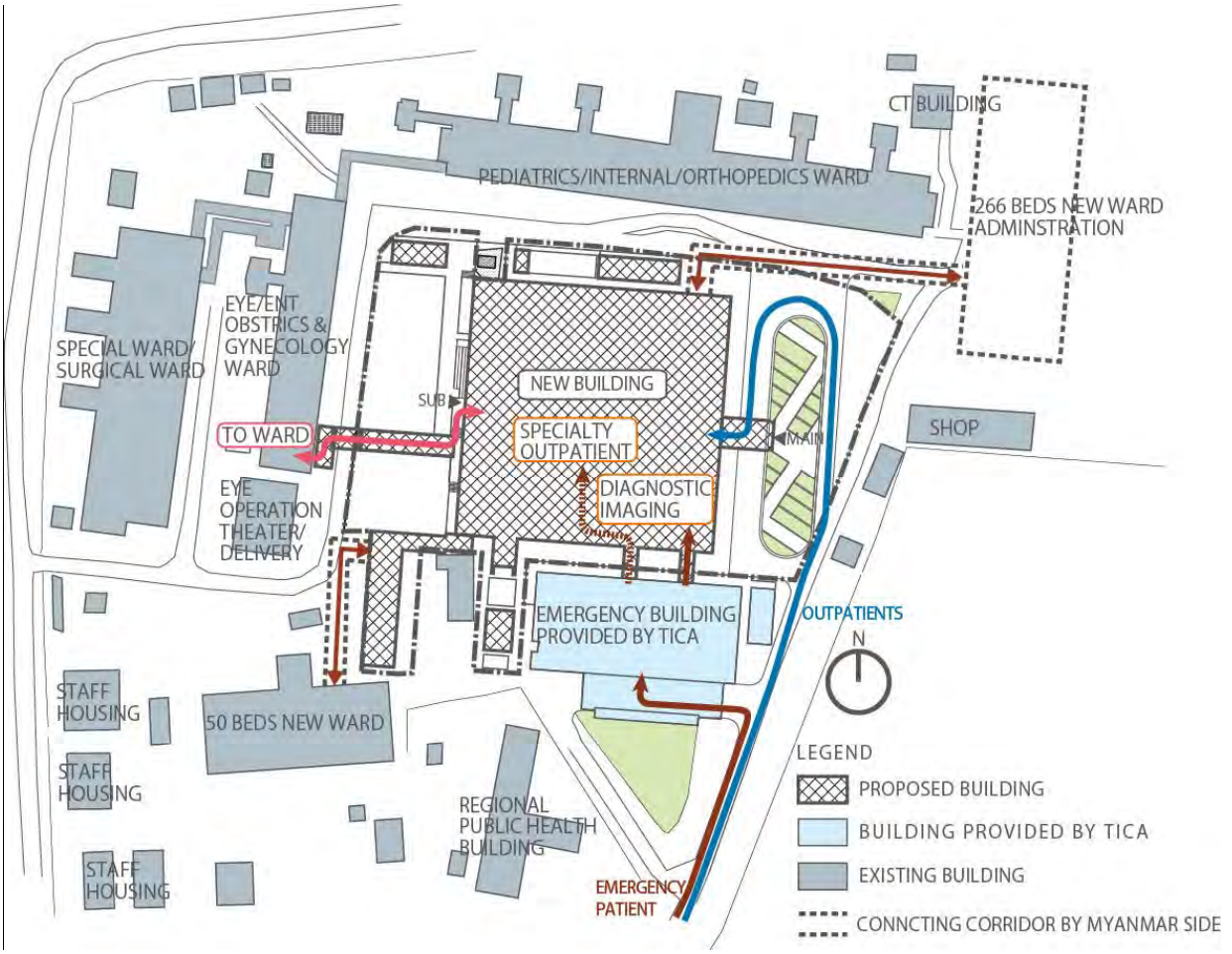


Figure 2-5 Access to the New Building

2) Composition of the New Building

As described in “Future Development Plan”, the Project will improve mainly the central diagnostic functions. All related departments will be located close together for effective medical services.

The outpatient department, the diagnostic imaging department, the laboratory unit and the endoscopy unit will be on the ground floor for simple circulation of outpatients and smooth flow between emergency and diagnostic departments. The diagnostic imaging department will be placed adjacent to the emergency building funded by TICA for quick diagnostic imaging for emergency patients. The laboratory unit will be next to the outpatient department for quick delivery of specimens and diagnosis.

To shorten and simplify patients’ circulation a Hospital Street will be designed in the middle of the ground floor as a major promenade for patients. As described in the section of “Future Development Plan”, the extension of the Hospital Street during the Myanmar side’s development of new wards will greatly simplify patients’ circulation.

The operation theater complex, the central sterile supply department and the ICU will be on the 1st floor. The central sterile supply department, for hospital materials sterilization, will be next to the operation theater complex. The ICU will be close to the operation theater complex, for provision of immediate life support to patients after the operation, who need close monitoring and support for recovery, and also for rapid responds to sudden changes in conditions.

The Project will install two hospital elevators for immediate and safe transfer of emergency patients from the emergency building funded by TICA to the operation theater complex and ICU on the 1st floor. In addition, a ramp will also be provided between the ground floor and 1st floor to ensure the smooth transportation of the emergency patients to the operation theater in case the two elevators are all out of order.

Figure 2-6 shows the composition of the new building.

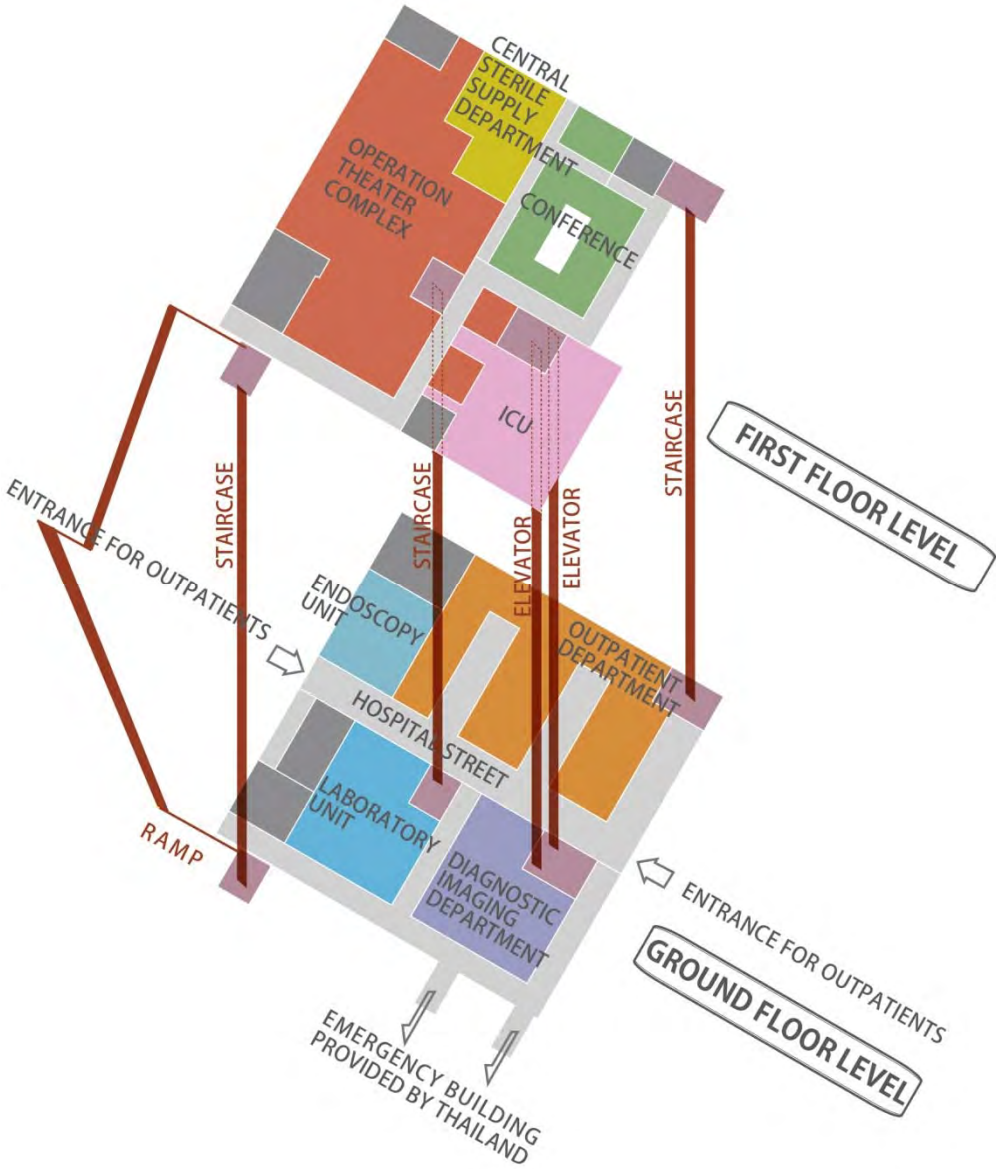


Figure 2-6 Composition of the New Building

3) Plan for Major Department

The main concept of the hospital design is to provide the patient-oriented medical services effectively in accordance with the current hospital management system in Myanmar.

Room layout will ensure provision of efficient services with a limited number of staff. Consideration

will also be given to disaster risk reduction, such as securing a two-way evacuation route from each room in case of fire, securing an adequate water and power supply for self-sufficiency in case of emergency.

Major departments to be improved in the Project are as described below.

A) Outpatient Department

The outpatient department will house outpatients consultation rooms for all the clinical departments currently operated namely; medicine, surgery, orthopedic, pediatrics, obstetrics/gynecology, eye, ENT, dermatology, dental, and psychiatric departments. In addition to the consultation rooms, it will house procedure rooms for the surgery, orthopedic and dental departments, and examination rooms for the eye department, and ENT. An echo room, an ECG room and a respiratory examination room will also be prepared for physiological function test. A medical social work office is also planned for referral to regional medical institutions and general consultation for patients.

Size of the consultation rooms will basically be 3,000 mm wide and 4,000 mm long, which is the standard size in Japan, and the rooms will be standardized for easy conversion in the future. Waiting areas will be on one side of the consultation rooms and staff corridors on the other so that the staff can smoothly move without mixing with the public.

The obstetrics/gynecology and pediatrics departments will have designated waiting areas, separated from the waiting area for the other outpatients, to prevent pregnant women and children from catching infections. The psychiatric department will have an exclusive entrance and waiting room separated from other outpatients.

Figure 2-7 shows the functional diagram of the outpatient department.

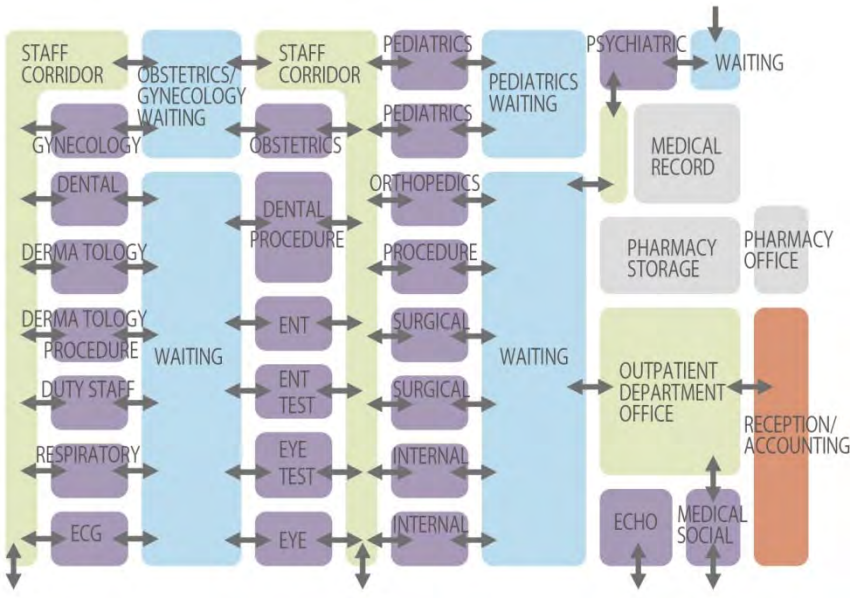


Figure 2-7 Functional Diagram of Outpatient Department

B) Diagnostic Imaging

For necessary diagnosis as a secondary care hospital, the Japanese side will install MRI, CT scanner, fluoroscopy X-ray, and general X-ray machines, while the Myanmar side will install a mammography unit. For rapid diagnostic imaging of emergency patients, the CT room will be placed adjacent to the emergency

building funded by TICA. Since magnetic fields can easily affect an MRI machine, the imaging room will be electromagnetic shielded and located a distance away from elevators, machine rooms, etc. The opposite side of the patient entrance of the imaging rooms will be connected to a control room to ensure efficient operation with a limited number of staff. Figure 2-8 shows the functional diagram of the diagnostic imaging department.

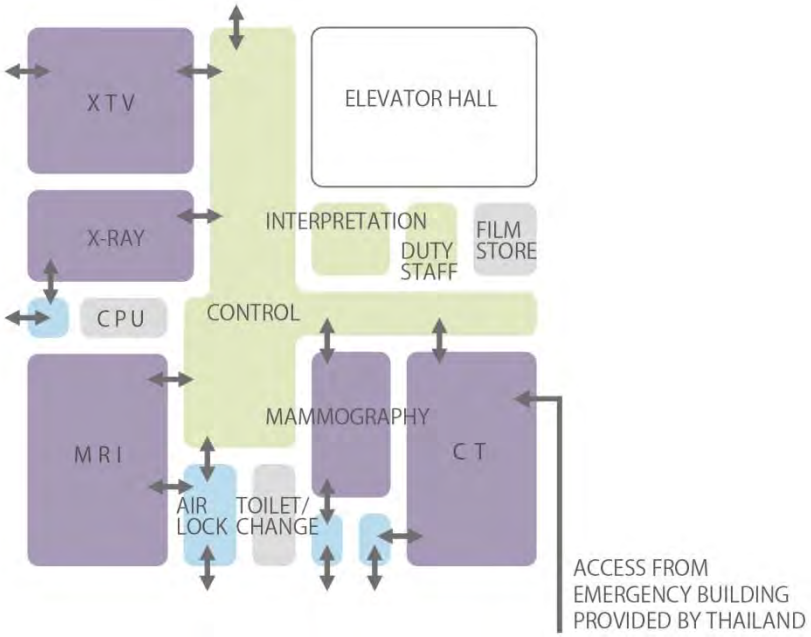


Figure 2-8 Functional Diagram of Diagnostic Imaging Department

C) Laboratory Unit

The plan will have a biochemistry room, hematology (blood) issues room, a microbiology room and histopathology rooms. A blood collection room and common toilets will be located next to the biochemistry area for quick testing of collected blood and urine samples. The biochemistry area and the blood issues area will be in a large room to shorten the circulation of staff and save space for testing equipment. The microbiology room will have an air lock with negative pressure for infection control. For histopathology, there are rooms for a series of sample preparation processes such as cutting, fixing and slicing and a microscopic examination room for sample observation. Figure 2-9 shows the functional diagram of the laboratory unit.

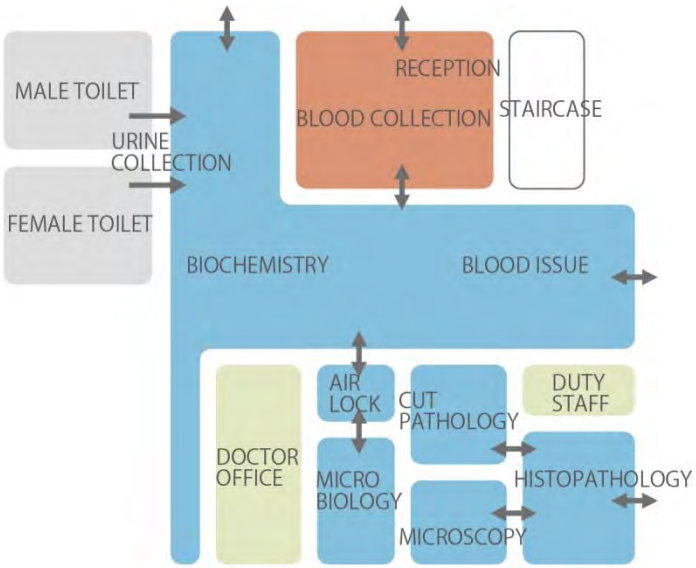


Figure 2-9 Functional Diagram of Laboratory Unit

D) Endoscopy Unit

The endoscopy unit will have two rooms, one for upper endoscopy and the other for colonoscopy. The opposite side of the patient entrance of each room will be connected to a washroom where endoscopic instrument will be decontaminated away from both patients sight and foot traffic. Rooms required for endoscopy will be minimized; preparation and examination before endoscopy will be conducted in the same room and the area of the recovery room for post-endoscopy will have space for two beds, the same number as the endoscopy rooms. Figure 2-10 shows the functional diagram of the endoscopy unit.

Figure 2-10 Functional Diagram of Endoscopy Unit

E) Operation Theater Complex, ICU and Central Sterile Supply Department

The operation theater complex's design will have an operation hall at the center for easy management and floor area saving. There will be six operation theaters – four major ones and two minor ones. Of the major operation theaters, Theater one will be for infection control and Theater six will have radiation

protection to enable use of a surgical X-ray TV machine, etc. Operation theaters will be placed around the entrance and the staff station to shorten the circulation of patients and staff. The infection control theater will be placed near decontamination for quick disposal of infectious wastes. There will be another route to the ICU separate from the main entrance so that patients can be transported quickly to the ICU after operation.

There will be six beds in the ICU. One of the beds will in an infection control room equipped with a negative pressure air lock. The beds will be placed around the staff station so that all patients can be physically monitored from the station. Medical gas (oxygen) will be supplied via a central piping system. Suction will be carried out with medical equipment.

In the central sterile supply department, attached to the operation theater complex, rooms will be arranged in accordance with the flow of the sterilizing operation from washing, assembling, sterilizing, and storing. The major responsibility of the department will be sterilization and supply of instruments for the operation theater complex. The arrangement of the department will be in a way that allows it to sterilize and supply instruments to the emergency building, the outpatient department, and the wards (existing and planned wards).

Figure 2-11 shows the functional diagram of the operation theater complex, the ICU and the central sterile supply department.

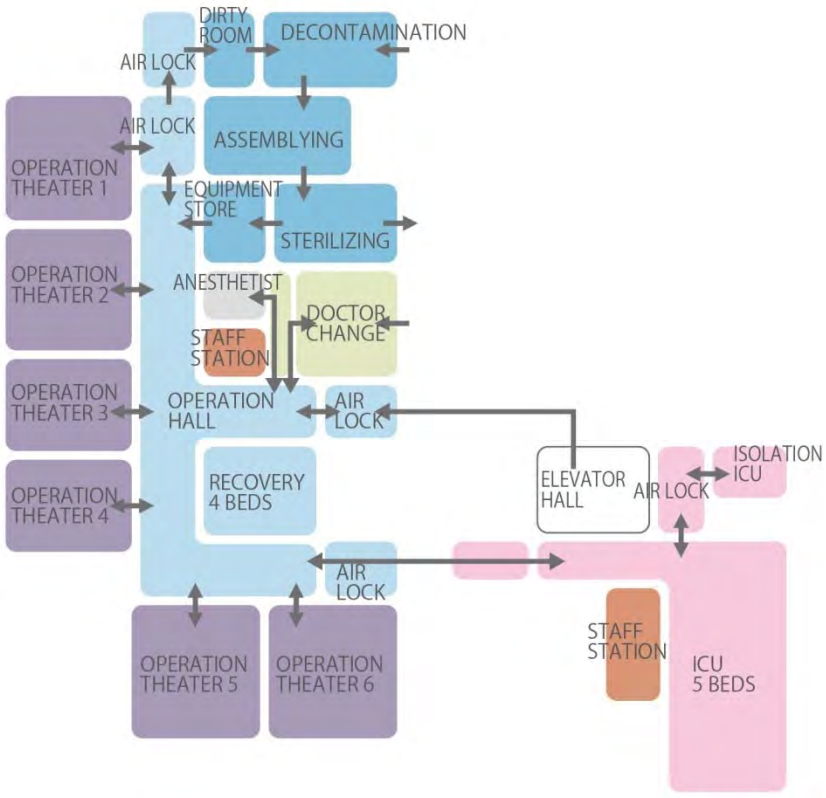


Figure 2-11 Functional Diagram of Operation Theater Complex, ICU and Central Sterile Supply Department

4) Floor Areas

Table 2-5 below shows the floor areas of major rooms.

Table 2-5 Floor Areas of Major Rooms

Dept.	Floor Level	Room/area name	Area per room (㎡)	Description
Outpatient Department	GFL	Consultation	12	Total 14 rooms shared by 11 clinical departments
	GFL	Procedure	12	Shared by surgical and orthopedic department
	GFL	Dermatology procedure	12	
	GFL	Dental procedure	23	Dental units are installed.
	GFL	Eye examination	14	
	GFL	ENT examination	10	
	GFL	ECG	12	
	GFL	Respiratory examination	12	
	GFL	Echo	12	
	GFL	OPD office	55	Central monitor of fire alarms is installed.
	GFL	Pharmacy office	14	Work place for pharmacists
	GFL	Pharmacy storage	25	
	GFL	Medical record	27	
Diagnostic Imaging Department	GFL	CT room	40	Radiation protection
	GFL	MRI room	50	Electromagnetic shield
	GFL	X-ray room	27	Radiation protection
	GFL	XTV room	34	Radiation protection
	GFL	Mammography room	22	Radiation protection
Laboratory Unit	GFL	Biochemistry, hematology, blood issue	148	Large room to layout equipment effectively
	GFL	Microbiology	19	Air lock with negative pressure
	GFL	Histopathology	27	Work place for sample preparation
	GFL	Cut pathology	18	Work place for cutting and fixing samples
	GFL	Microscopy	16	Work place for observation of samples
	GFL	Blood collection room	52	
Endoscopy Unit	GFL	Upper endoscopy	20	
	GFL	Colonoscopy	20	
	GFL	Examination	11	Serves as procedure
	GFL	Recovery	21	Recovery room after endoscopy
Operation Theater Complex	1st FL	Operation theater (major)	60	4 rooms (including one room for infection control and one room with radiation protection)
	1st FL	Operation theater (minor)	40	2 rooms
	1st FL	Recovery	54	Area for patients required close monitoring after operation
ICU	1st FL	ICU	180	5beds
	1st FL	Isolation ICU	25	1bed for infected patients, air lock with negative pressure
Central Sterile Supply Department	1st FL	Decontamination	50	
	1st FL	Assembling	54	
	1st FL	Store for Sterilized items	52	

(2) Cross-sectional Plan

The height of each story will be such that the ceiling height of operation theaters and diagnostic imaging

rooms is at least three meters and there will be sufficient space for air conditioning and ventilation system ducts, and piping in the ceiling. As for the space for ducts and piping, considering construction skills of the local contractors, the ducts and piping will be installed under structural beams without openings in the beams. Taking these conditions into consideration, the height of the ground floor will be 4.6 meter, while the height of the 1st floor will be 5.1 meter to secure space for clean environment required for the operation theater complex.

(3) Interior and Exterior Finishing

1) Basic Policy

Policy for selection of the finishing materials is as follows:

・Use as many locally available materials as possible to reduce the construction period and cost, and

・Select materials that can be maintained locally.

2) Finishing Material

Major exterior finishing materials are listed in Table 2-6 below.

Table 2-6 Major Exterior Finishing Materials

Part	Finishing materials	Notes
Roof	Protective concrete layer on asphalt water proofing with thermal insulation	Considering thermal insulation
Exterior wall	Paint/bricks	Commonly used in Myanmar
Doors and windows	Aluminum fitting	Considering durability

Major interior finishing materials are listed in Table 2-7 below.

Table 2-7 Major Interior Finishing Materials

Room	Finishing materials				Notes
	Floor	Skirting	Wall	Ceiling	
Consultation etc.	Terrazzo tile	Terrazzo tile	Paint	Mineral fiber board	Typical in Myanmar
Diagnostic imaging room etc.	Vinyl sheeting	Wood	Paint	Paint	Radiation protection, Electromagnetic shield
Operation theater	Vinyl sheeting	Vinyl sheeting	Composite panel	Composite panel	Considering cleaning
Laboratory	Vinyl sheeting	Wood	Paint	Paint	Considering cleaning
Corridor etc.	Terrazzo tile	Terrazzo tile	Paint	Paint	Typical in Myanmar
Toilet etc.	Ceramic tile	Ceramic tile	Ceramic tile (paint on the upper part)	Paint	Typical in Myanmar
Storage	Terrazzo tile	Terrazzo tile	Paint	Paint	Typical in Myanmar
Machine room	Dust-proof paint	Paint	Paint	Paint	Typical in Myanmar

(4) Structural Design

1) Ground Conditions of the Project Site and Foundation Structure Design

The subsoil of the Project site is consisted of none sticky clay, clayey sand and silty sand with N-value of 10 – 30 at a depth of 18 – 22 meters. Deeper than these layers, silty sand with N-value of more than 50 is observed. Therefore, a pile foundation will be adopted for the new building assuming that this silty sand layer would be a supporting layer.

2) Superstructure Design

Reinforced concrete frame and concrete block walls for non-anti-seismic elements common in Myanmar will be adopted.

3) Load

The buildings will have necessary structural resistance against natural disasters assumed in the region such as earthquakes. Considering the local climate and geographical conditions, the external forces and loads are assumed as follows;

A) Dead Load

The dead load is calculated by adding up the weight of all structural and finishing materials to be used on the new building.

B) Wind Load

The wind load is calculated in accordance with the Japanese building codes.

C) Live Load

The live load is calculated in accordance with the Japanese building codes.

D) Seismic Load

The seismic load is estimated in reference to the earthquake zone map in Myanmar. According to the map, the Project site is located in Earthquake Zone IV (Severe Zone), where the possible peak ground acceleration is estimated at 0.31-0.4G and shakings with intensity scale VIII to in the Modified Mercalli Intensity Scale can happen.

4) Structural Material

Major structural materials are listed in Table 2-8 below.

Table 2-8 Major Structural Materials

Materials	Specifications
Concrete	Design strength: Fc=30N/㎟
Reinforcing bar	Yield Strength:345 N/㎟、295 N/㎟

(5) Electrical System Design

1) Service Drop and Transformer System

Electricity will be supplied through an 11 kV high-voltage cable installed by the Myanmar side for the new building. A new transformer will step down the voltage and distribute to the electrical room. An AVR (Automatic Voltage Regulator) to cope with voltage fluctuation will be installed in order to protect medical equipment from power surges.

2) Power Supply System

Electricity will be supplied from a main distribution board in the electrical room to switchboards and control panels in the building.

In light of frequent power failures, a backup generator will be installed for secure power supply for

essential services of the new building in case of power failure. It will supply power to the diagnostic imaging department, operation theater complex, ICU, pumps, elevators etc. For medical equipment with computers such as diagnostic imaging equipment, UPS (Uninterruptible Power Supply) devices will be provided in the equipment works in order to supply electricity continuously until the backup generator runs after a power failure.

3) Lighting Fixtures and Socket Outlets

A lighting distribution switchboard will be installed on each floor with an appropriate circuit configuration. Conduit wiring work from the switchboards to lighting fixtures and socket outlets will be conducted.

A) Lighting Fixtures

- General lighting：light emitting diode (LED) lighting fixtures will mainly be installed
- Special lighting：operation lamps for the operation theaters will be installed in the equipment works
- Emergency and exit lighting：battery-operated lighting fixtures will be installed

B) Socket Outlets

All socket outlets will be earthen. The circuit configuration for medical equipment will meet layout and power supply requirements of the equipment.

4) Telephone System

There is an existing PBX (private branch exchange) is at MS office in the Project site. As the Myanmar side will remove it to make space for the Project site, new PBX will be installed in a new building under the Project. The telephone system will be planned in a way to allow internal calls in existing and new buildings.

5) Local Area Network (LAN) System

Conduit installation work for future LAN system from the control room where switches will be located to necessary rooms will be conducted.

6) TV Reception System

TV outlets will be installed in necessary rooms. A TV antenna will be installed on the roof of the new building.

7) Fire Alarm System

Fire alarms will be installed. A fire alarm panel will be installed in the OPD office of the new building.

8) Lightning Protection

A lightning rod will be installed on the roof for protection against lightning strikes.

(6) Mechanical System Design

1) Air Conditioning System

In light of easiness of procurement and maintenance, package air conditioning units will be installed in the following room:

・Rooms for patients with serious conditions and rooms for medical services necessary for temperature control such as the operation theaters and ICU etc.
・Rooms requiring temperature control to maintain functions of medical equipment and reduce heat load from equipment such as diagnostic imaging rooms and the CPU room etc.
・Rooms requiring temperature control in view of work efficiency such as the doctor rooms etc.

Ceiling or wall mounted fans will be installed in non air conditioned rooms. At air outlets of the operation theater a high efficiency filter will be installed, whose replacement period is longer than that of a HEPA filter[7].

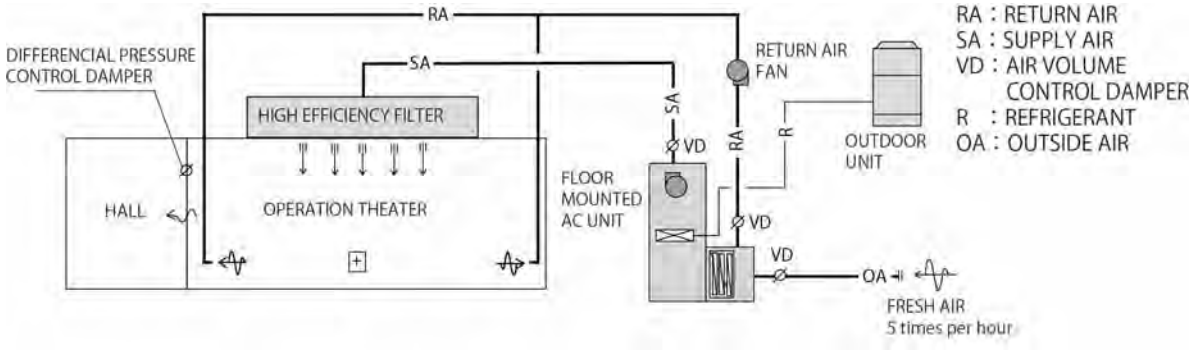


Figure 2-12 Air Conditioning System for Operation Theater

2) Ventilation system

Though natural ventilation system will be adopted, mechanical ventilation system will be installed for the following rooms:

・Air conditioned rooms except for rooms where sufficient natural ventilation is expected.
・Rooms where smell and moisture will be generated such as the dirty rooms, the shower rooms and the toilets etc.
・Rooms not facing exterior wall, where natural ventilation is not expected.

3) Plumbing System

A) Sanitary Appliance

Sanitary appliances such as western-style low-tank toilets, urinals with flush-valves and washbasins will be installed. Hand showers for the toilets will be also installed.

B) Water Supply System

Water will be supplied with gravity from an elevated water tank. Water is pumped from a new deep well to a receiving tank before being lifted to elevated water tank. Purified water produced by local water suppliers will be used for drinking and medical services in the new building as is with the existing buildings. Other purposes will use water from the deep well, filtered to meet with the required standard of water

[7] High efficiency filter is a filter which has 98% or more collecting efficiency in JIS dust-spot efficiency. Generally, replacement frequency of HEPA filter and high efficiency filter is one time per three years and ten years respectively.

quality.

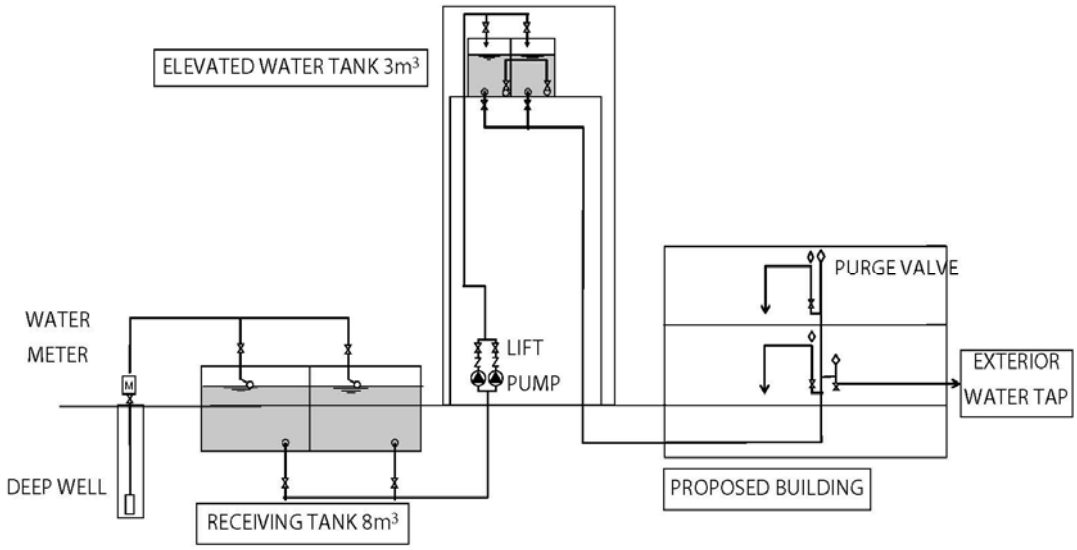


Figure 2-13 Water Supply System

C) Drainage System

Miscellaneous wastewater and sewage water will be discharged to the existing gutter or a soak pit after treatment through a combined septic tank.

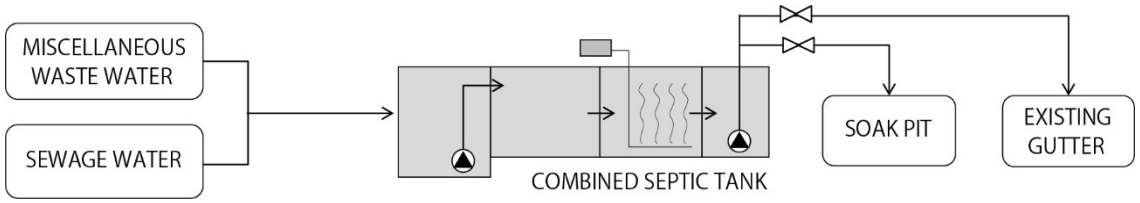


Figure 2-14 Drainage System

D) Firefighting System

Firefighting systems such as fire extinguishers, indoor fire hydrant system and integrated hydrant system will be installed following instructions of the Fire Services Department of the Dawei District.

E) Hot Water Supply System

An electrical hot water supply system will be installed for medical equipment and showers.

F) Medical Gas System

Medical oxygen will be produced by the oxygen generator and provided via a central piping system. Though medical air, suction and nitrous oxide will be provided by medical gas equipment, the Project will be include piping work and outlet installation of medical air and suction. The project will also secure area for installing equipment such as pumps and compressors for the gas system considering future functional improvement. Also, an exhaust air system will be installed in order to protect medical staff from health

problems because of nitrous oxide.

2-2-2-3 Equipment Plan

(1) Equipment Selection Policy

Initially, the Government of Myanmar prepared an extensive list of equipment to be provided by the Japanese side taking into consideration all medical service activities expected in the new building. They referred to “Standard Equipment List for 200 bedded Hospital”. Then, equipment to be installed is selected from this long list.

It was agreed that new equipment which is not covered under the Project, complementary medical furniture, and general furniture will be procured by the Myanmar side. The Myanmar side will also be responsible for relocating existing equipment from the current building. A three-year comprehensive maintenance contract (CMC) for the CT scanner will be a part of the equipment works by the Japanese side. It will include one-time replacement of X-ray tube and one-time replacement of recommended spare parts within three years as well as periodic checks.

(2) Equipment Plan

1) Outpatient Department

In the new building, there will be consultation rooms, procedure rooms and examination rooms for the ten specialties; medicine, surgery, orthopedic, pediatrics, ENT, eye, dental, obstetrics/gynecology, dermatology, and psychiatric for the outpatient department.

Installation work of the dental unit[8] and ENT unit[9] requires coordination with other construction works such as power and water supply and water drainage etc., hence their equipment will be covered by the Japanese side. Also, film viewers which require coordination with the construction works in terms of wall mounting positions will be included in the Project. The equipment in the outpatient department covered by the Japanese side is as shown in Table 2-9.

Table 2-9 Major Equipment in the Outpatient Department covered by the Japanese side

No.	Name	Qty
4	Dental Unit	2
5	ENT Unit	1
13	Film viewer (for one film)	10

Other equipment necessary for outpatient clinical activities such as desk and chair, examination table and procedure table will be procured by the Myanmar side.

2) Diagnostic Imaging Department

The diagnostic imaging equipment such as CT scanner, MRI unit, fluoroscopy X-ray machine and general X-ray machine will be installed.

Currently, the CT scanner is mainly used for imaging head trauma. Since imaging for cardiac diseases,

[8] Used for caries procedure and teeth extraction etc. with chair unit supplied with power, water and compressed air and with drainage system.

[9] Used for consultation and procedure for ENT diseases in combination with consultation chair and procedure unit.

such as cerebro-vascular disease is predicted to increase in the future, a 32 row 64 slices CT scanner will be installed to cope with the future demands. MoHS plans to have at least one stroke center in each major city within five years. Thus, it is necessary for the CT scanner to have functions required by the stroke center such as evaluation function of effectiveness of thrombolytic therapy.

Regarding MRI unit, a 0.35-0.4 tesla open type with permanent magnet will be installed, as quench[10] accidents caused by voltage fluctuation don't occur with the permanent magnetic type. The MRI unit is used for imaging for mainly cerebral area as well as for orthopedic and obstetrics/gynecology.

A fluoroscopy X-ray machine will be used for imaging during removal of ingested objects with an endoscope, reposition in case of fracture and dislocation, observation of contrast medium flow in ureter, and trauma cases.

A general X-ray machine frequently used in the DGH, will be also included in the Project for imaging for fracture or tuberculosis etc. The equipment in the diagnostic imaging department covered by the Japanese side is as shown in Table 2-10.

Table 2-10 Equipment in Diagnostic Imaging Department covered by the Japanese side

No.	Name	Qty
3	CT Scanner	1
6	Fluoroscopy X-ray machine	1
7	General X-ray machine	1
11	MRI Unit	1

The screen resolution of the existing ultrasound scanner in DGH is low and a sector probe for cardiac diseases is not equipped. Therefore, an ultrasound scanner for cardiology with sector scanning function as well as Mammography unit for diagnosis of breast cancer needs to be procured by Myanmar side.

3) Laboratory Unit

Laboratory unit in the Project has six functions; hematology, biochemistry, microbiology, histopathology/parasitology, blood issue and blood collection. MoHS has already procured the equipment necessary for sampling tests for the existing laboratory unit. Current sampling tests such as urinalysis, stool examination, hematology test, electrolyte test, and biochemical test are the same as those to be conducted in the laboratory unit under the Project. Hence, the Myanmar side will relocate the equipment from the existing laboratory unit to the new building laboratory. The major equipment to be relocated is as follows.

Table 2-11 Major Equipment relocated from the existing Laboratory Unit by the Myanmar side

Biochemistry, Hematology	Parasitory, Histopathology	Microbiology	Blood issue
Automated biochemistry analyzer (1)	Automatic sliding strainer (1)	Incubator (1)	Blood bank refrigerator (3)
Semi-automatic biochemistry analyzer (1)	Genetic analyzer (1)	Oven (1)	Deep freezer for blood component storage (2)
Electrolyte analyzer (1)	Computer for genetic analyzer (1)	Safety cabinet (1)	Micropipette set (1)
Water distiller (1)	Printer for genetic analyzer (1)	Microscope (1)	Microscope (1)
Spectrophotometer (2)	Paraffin bath (1)	Urine Analyzer (1)	Platel et incubator with agitator (1)

[10] It is a phenomenon that superconductive MRI unit loses its superconductivity due to rise of internal temperature or extreme current and magnetic field, then hoarded magnetic energy is emitted as a heat.

Blood cell counter (1)	Tissue processor (1)	Refrigerator (1)	Centrifuge for serofuge (1)
Centrifuge (3)	Microtome (1)	High pressure steam sterilizer (1)	Plasma centrifuge (1)
Coagulation analyzer (1)	Hot air oven (1)	Centrifuge (1)	Refrigerated centrifuge (1)
Blood gas analyzer (1)	Refrigerator (1)		Donor bed (2)
Microscope (1)	Thawing water bath (1)		Hemoglobin meter (1)
ELISA machine (1)			Blood bag shaker (2)
Thawing water bath (1)			Consultant desk and chair (1)
CD4 analyzer (1)			Apheresis machine (1)
Hematocrit centrifuge (1)			Leukocyte reduction machine (1)

4) Endoscopy Unit

Currently endoscopic examination is not conducted in DGH. The demand for esophagogastroduodenoscopy and digestive endoscopy is expected to increase as the cases of malignant neoplasm (cancer) may increase in the future. The following equipment for the endoscopy unit will be procured by the Myanmar side.

Table 2-12 Major Equipment procured by Myanmar side in Endoscopy Unit

Endoscope for upper part	Endoscope for lower part	Equipment in common use
Bronchoscope (1)	Colonoscope (1)	Endoscopic table (2)
Gastrointestinal fiberscope (1)	Electrosurgical unit (1)	Endoscope rack (2)
Duodenoscopy (1)	Video Processor (1)	Recovery bed (1)
Video Processor (1)	Light source (1)	Examination bed (1)
Light source (1)	Endoscopy cart (3)	
Endoscopy cart (1)		

5) Operation Theater Complex

Four major operation theaters and two minor operation theaters are planned in the operation theater complex. An operation lamp will be installed in each operation theater. Since high illuminance is required in the major operation theaters, dual lamp type with main and supplementary lamps will be provided. While single lamp type will be provided in minor operation theaters considering limited operation fields in minor cases. Since 2012, MoHS has been providing operation theaters in DGH with medical equipment, such as anesthesia machine, electrosurgical unit, patient monitor, ENT operating microscope and suction unit. The equipment can be relocated and utilized in the new building. One warm cabinet will be installed in staff station in order to control temperature of infusion bags and maintain other fluid bags etc. at body temperature. The equipment in operation theater complex covered by the Japanese side is as shown in Table 2-13.

Table 2-13 Major Equipment in Operation Theater Complex

No.	Name	Qty
1	Operation lamp A (dual lamp type, for major surgery)	4
2	Operation lamp B (single lamp type, for minor surgery)	2
8	Hand scrub station	3
12	Warm cabinet	1
14	Film viewer (for two films)	4

The equipment listed in below will be procured by the Myanmar side.

Table 2-14 Major Equipment Procured by the Myanmar Side in Operation Theater Complex

Name *Quantity is shown in ( )		
Caesarean instrument Set (4)	Major surgical instrument set (2)	Oxygen flowmeter & humidifier (6)
Operation table (6)	Patient monitor (6)	Electrosurgical unit (6)
Infusion pump (10)	Syringe pump (10)	Suction unit (6)
Oxygen concentrator (3)	Mayo's Tray with stand (6)	Kidney Tray (6)
Laryngoscope set for adult and pediatric (6)	Instrument trolley (6)	Medicine trolley (6)
Infusion stand (6)	Defibrillator (5)	Stretcher (2)
Resuscitation set (6)	Adjustable stool for surgeon (6)	Anesthesia machine with ventilator (6)
Recovery bed (4)	ENT operating microscope (1unit, to be relocated)	Fluoroscopy X-ray machine (mobile type) for surgery (1unit, to be relocated)
Warm cabinet (1)	Cold cabinet (1)	

6) Central Sterile Supply Department

Since the central diagnostic functions for whole DGH will be upgraded by the Project, the central sterile supply department will be designed based on the capacity required by the whole hospital. Required sterilization volume will be about 2,000～2,400L[11] considering that there are six operation theaters, the outpatient department, emergency unit, and the wards. A large size (600L) and a medium size (400L) high pressure sterilizer will be installed in order to meet the demand by operating the large type for two or three times a day and medium type for one or two times a day. The equipment in the central sterile supply department covered by the Japanese side is as shown in Table 2-15.

Table 2-15 The Equipment in Central Sterile Supply Department covered by the Japanese side

No.	Name	Qty
9	High pressure steam sterilizer L	1
10	High pressure steam sterilizer M	1

The equipment listed in Table 2-16 will be procured by the Myanmar side.

Table 2-16 Major Equipment Procured by Myanmar Side in Central Sterile Supply Department

Name *Quantity is shown in ( )		
Dressing drum (2)	Linen cart (4)	Working table (3)
Chair (6)	Sterile store cabinet (9)	

7) ICU

Considering the shortage of nurses in DGH, central patient monitor will be installed in staff station, which enables to monitoring of the status of patients in critical condition by small number of staff. The following equipment will be procured by the Myanmar side in the ICU.

Table 2-17 Major Equipment procured by Myanmar side in ICU

Name*Quantity is shown in ( )		
ICU bed (6)	Oxygen concentrator (2)	Defibrillator (1)
Patient monitor (6)	Infusion pump (6)	Syringe pump (6)
Infusion stand (6)	Ventilator (4)	Oxygen flowmeter and humidifier (6)
Mobile X-ray unit (1)	Emergency cart (1)	Blood gas analyzer (1)

[11] Sterilization volume is 1,600L～1,800L from operation theater complex and 400～600L from other departments.

The equipment list and specifications of major equipment in the Project are as shown in Table 2-18 and Table 2-19.

Table 2-18 Planned Equipment List

No.	Name	Qty
1	Operation lamp A (dual lamp type, for major surgery)	4
2	Operation lamp B (single lamp type, for minor surgery)	2
3	CT Scanner	1
4	Dental unit	2
5	ENT unit	1
6	Fluoroscopy X-ray machine	1
7	General X-ray machine	1
8	Hand scrub station	3
9	High pressure steam sterilizer L	1
10	High pressure steam sterilizer M	1
11	MRI unit	1
12	Warm cabinet	1
13	Film viewer (for one film)	10
14	Film viewer (for two films)	4

Table 2-19 Specifications of Major Equipment

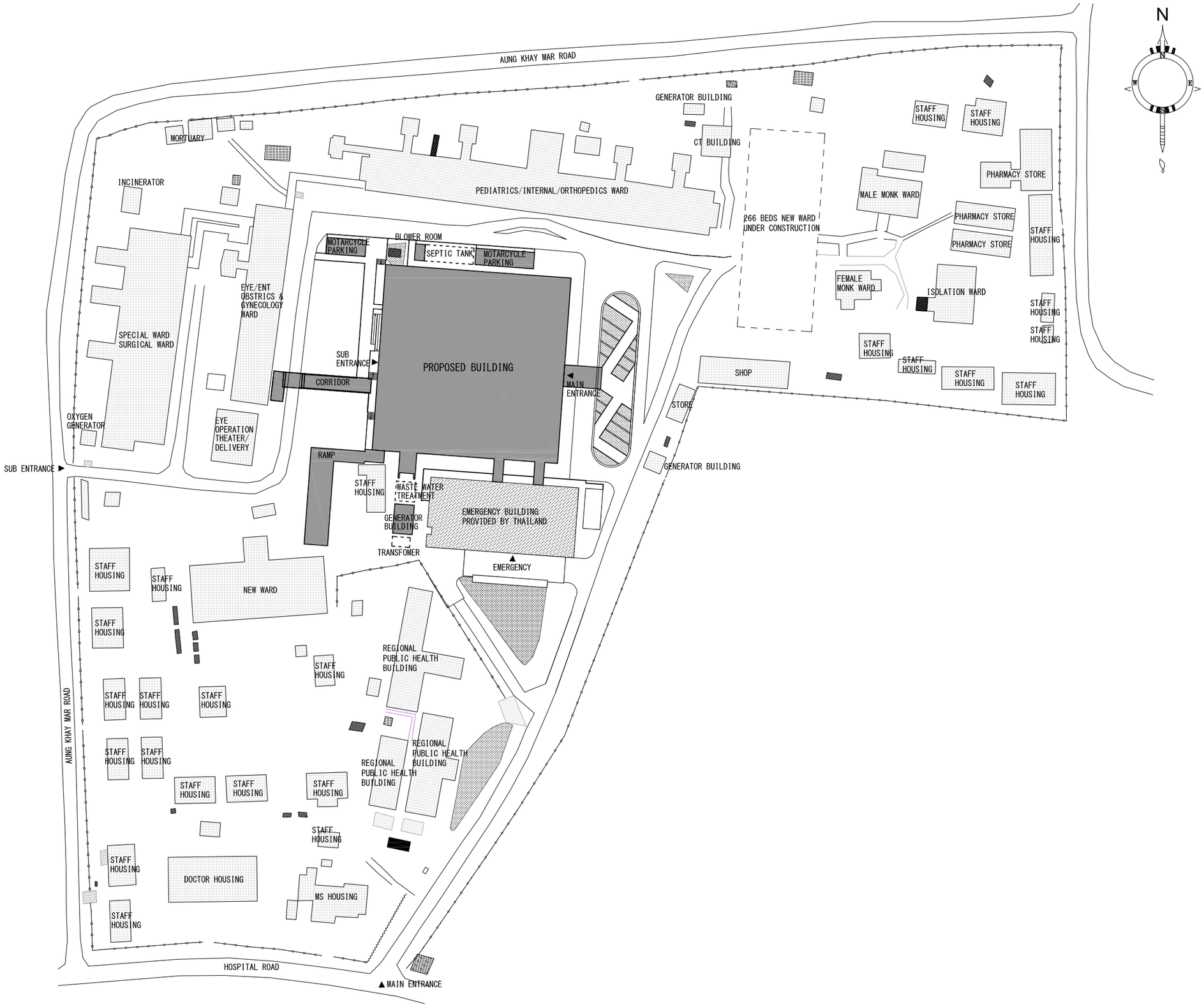
No.	Name	Qty	Purpose of Use, Validity of Equipment Grade
1	Operation lamp A (dual lamp type, for major surgery)	4	It provides uniform intensity of illumination with no shadow in operation fields for major surgeries. Since major surgeries require higher intensity of illumination with a wider range, dual light type will be provided. It is found typical in operation theaters.
2	Operation lamp B (single lamp type, for minor surgery)	2	It provides uniform intensity of illumination with no shadow in operation fields for minor surgeries. Since operation fields for minor surgeries are limited, it is deemed that single light type is enough for this purpose. It is found typical in operation theaters.
3	CT scanner	1	It obtains tomographic image by irradiating X-ray from many directions to the body, and measuring the X-ray absorption by computer processing. It is used for imaging for emergency patients. A 32 rows 64 slices type is found typical in hospitals which diagnose emergency patients having stroke etc.
4	Dental unit	2	It is used for caries procedure and teeth extraction etc. It includes a patient chair, and it is connected to power and water supply and drainage system of the new building. It is found typical in secondary care hospitals
5	ENT unit	1	It is used for consultation and procedure for ENT diseases. The equipment consists of chair unit and procedure unit. It is found typical for ENT specialty department in secondary care hospitals
6	Fluoroscopy X-ray machine	1	It is used for imaging and fluoroscopy。During imaging, a patient can change his/her position. It is expected to be used for emergency patients to detect the fracture part and the cause of accidental ingestion. Two X-ray tube type is provided, which can be used for fluoroscopy and general X-ray imaging. It is found typical in secondary care hospitals.
7	General X-ray machine	1	It is used for general X-ray imaging of the chest and abdomen of a patient. Since DR (Digital Radiography) system can show images instantly without films, it assists quick diagnosis. It is found typical in secondary care hospitals.

No.	Name	Qty	Purpose of Use, Validity of Equipment Grade
8	Hand scrub station	3	Surgeon and assistant medical staff wash their hands with this equipment prior to surgery so as not to bring bacteria into the operation field. It is found typical as equipment for operation theater complex.
9	High pressure steam sterilizer L	1	It sterilizes instruments and linens by high pressure steam in a short time. It is found typical in sterilization units.
10	High pressure steam sterilizer M	1	Same as above
11	MRI unit	1	It captures an image of internal human body by nuclear magnetic resonance technology. It visualizes high-precision 3D image and it is used to confirm affected parts of the soft tissue. Due to voltage fluctuation in DGH, a permanent magnetic open type is planned to be installed. In this type there is no anxiety about quench accidents. It is found typical for diagnostic imaging departments in secondary care hospitals in Myanmar.
12	Warm cabinet	1	It keeps infusion bags and other fluid bags etc. to be used in operations at body temperature. It is found typical in operation theater complex.
13	Film viewer (for one film)	10	To view X-ray pictures at outpatient consultation rooms
14	Film viewer (for two films)	4	To view X-ray pictures at operating theaters

2-2-3 Outline Design Drawing

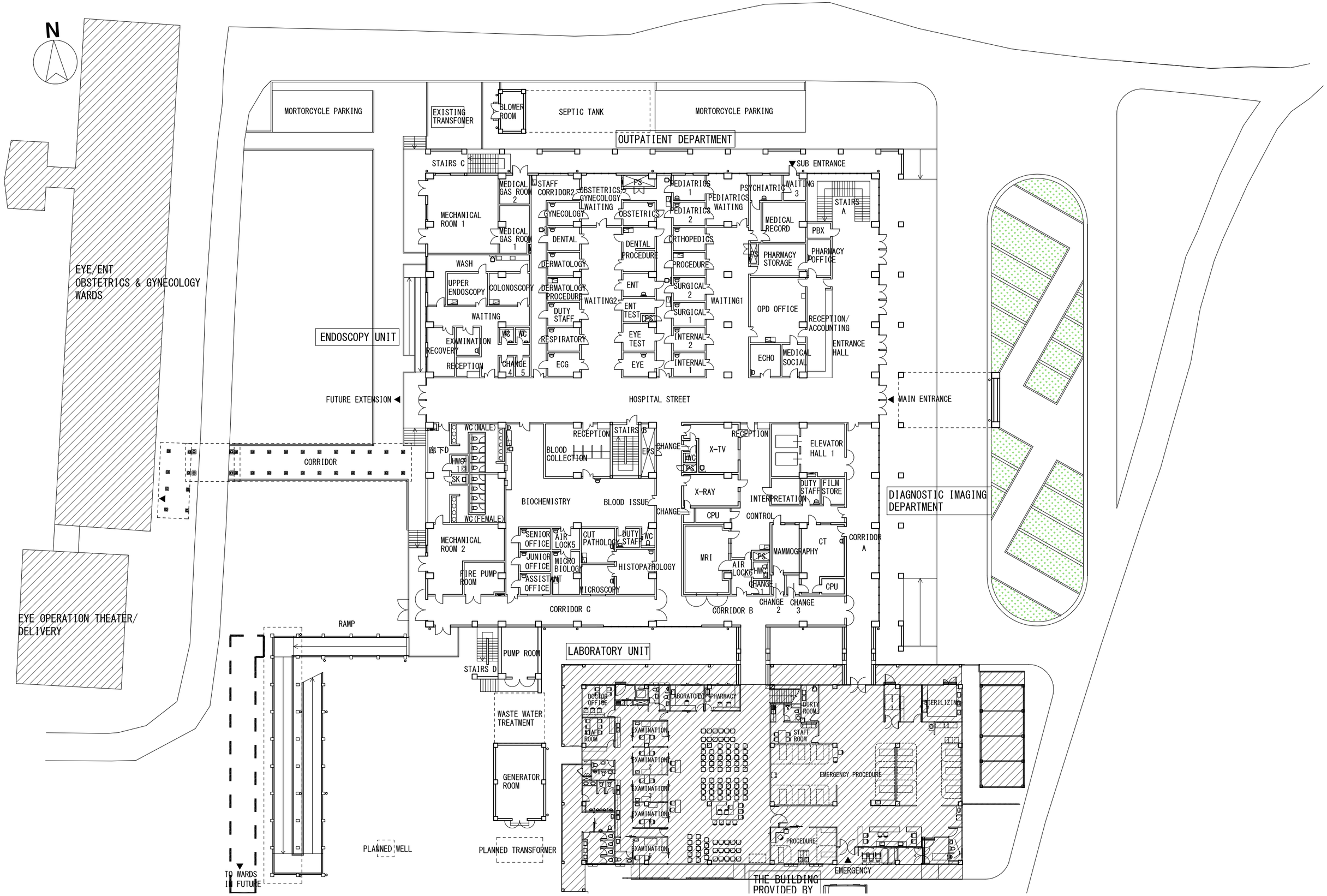
The following outline design drawings are presented on the following pages.

Site plan
Ground floor plan
First floor plan
Elevations
Sections



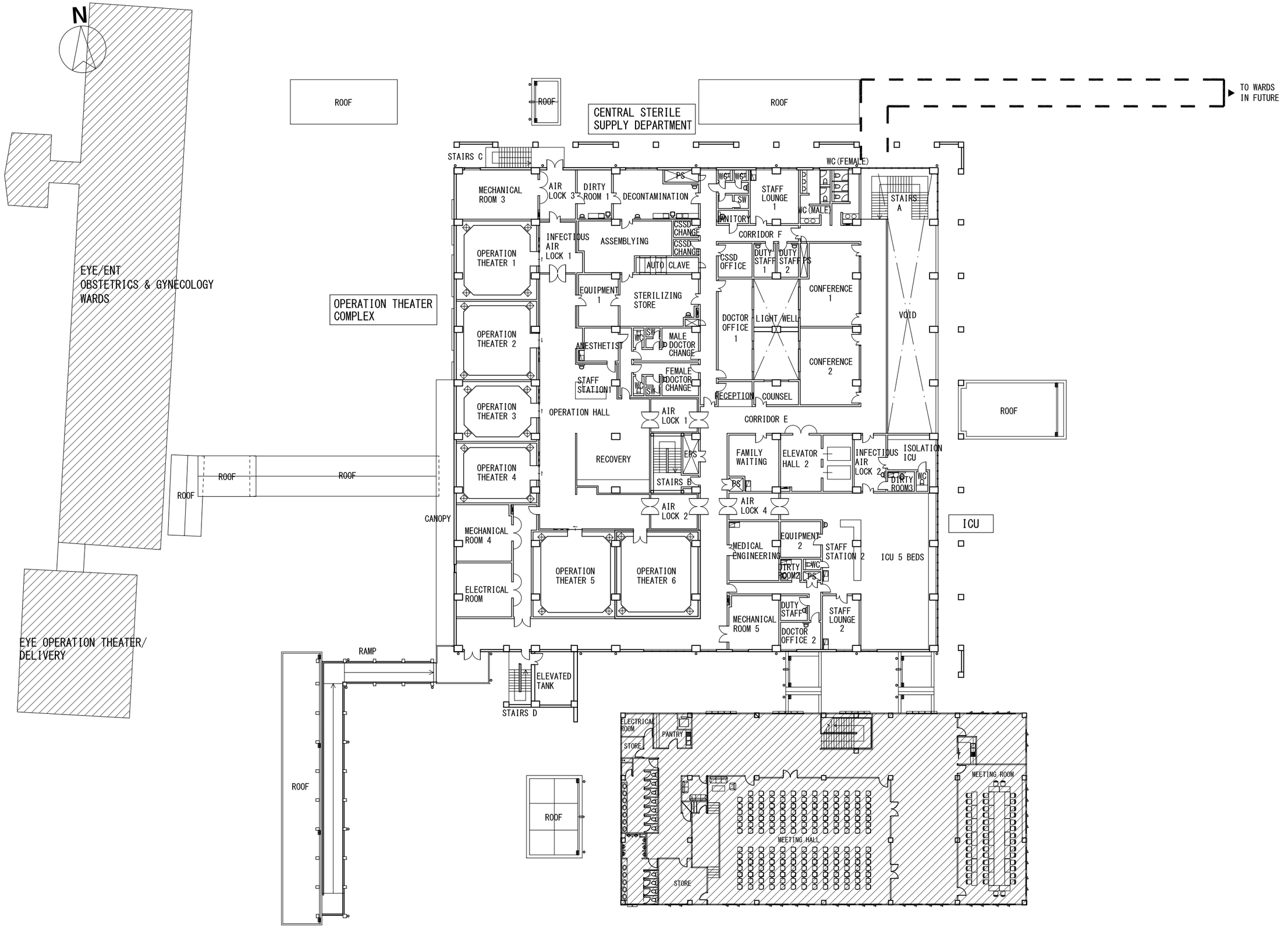
THE PROJECT FOR IMPROVEMENT OF DAWEI GENERAL HOSPITAL

SITE PLAN 1/1200



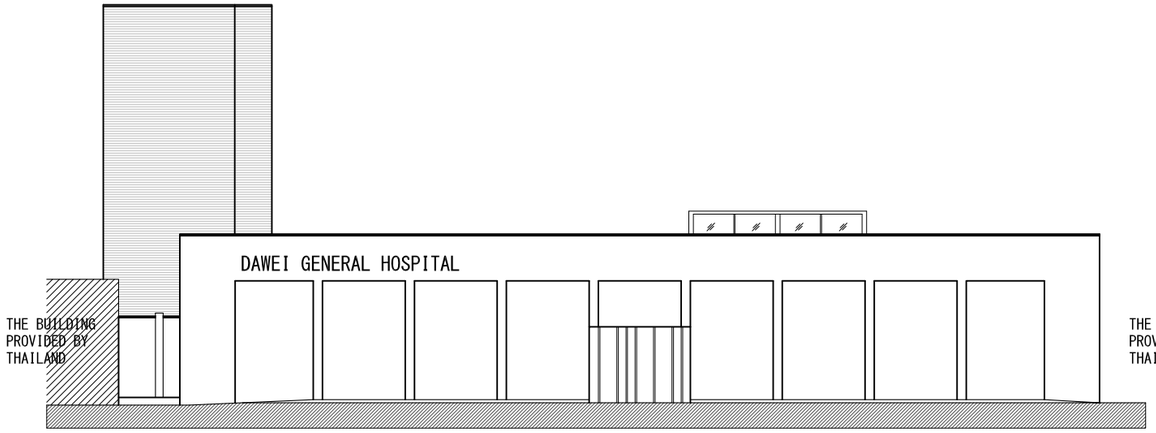
THE PROJECT FOR IMPROVEMENT OF DAWEI GENERAL HOSPITAL

GROUND FLOOR PLAN 1/400

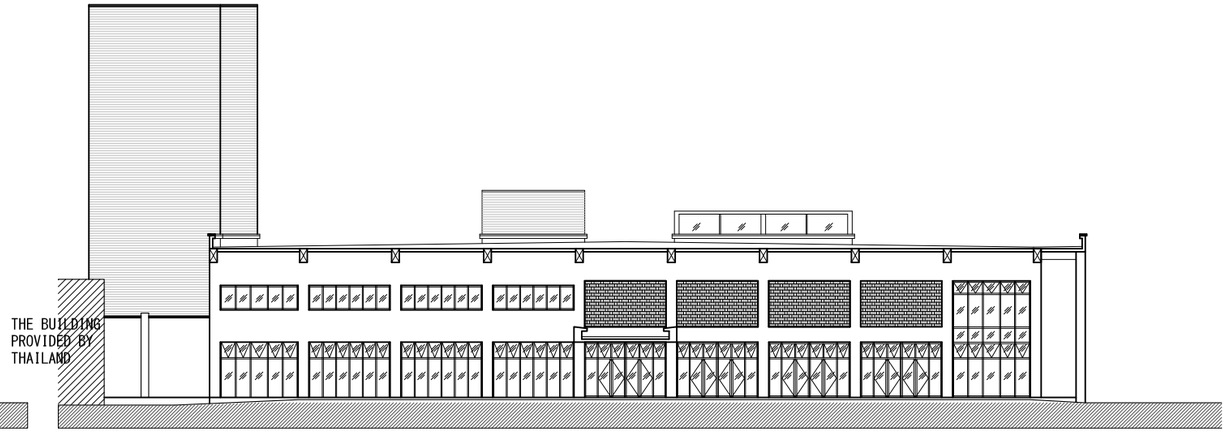


THE PROJECT FOR IMPROVEMENT OF DAWEI GENERAL HOSPITAL

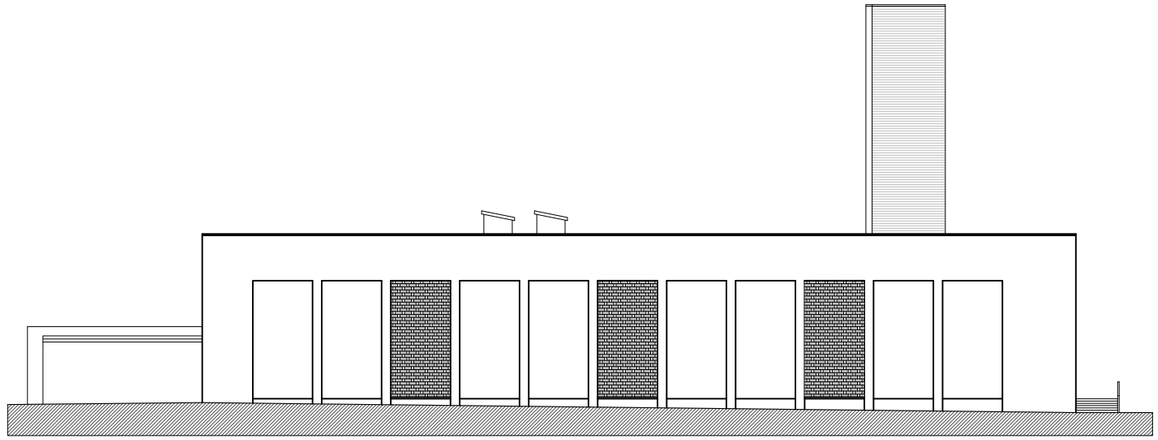
1ST FLOOR PLAN 1/400



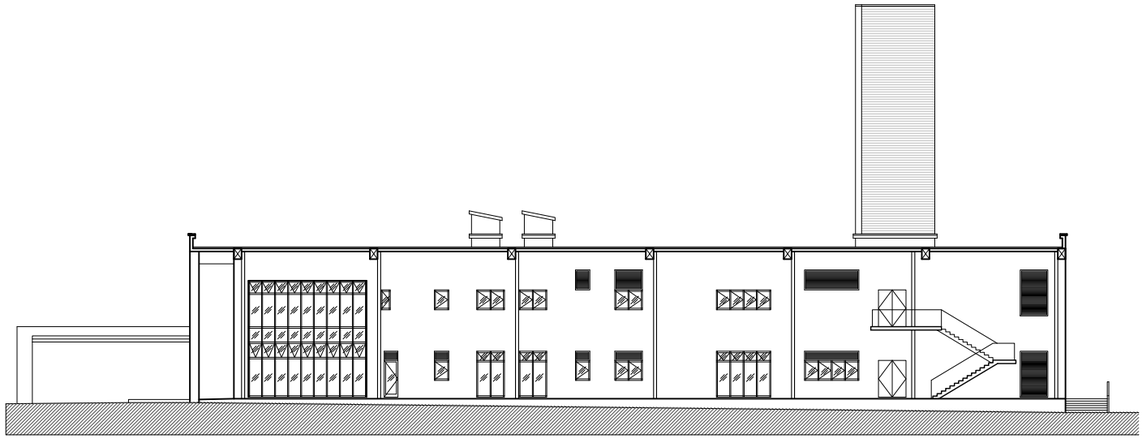
EAST ELEVATION 1



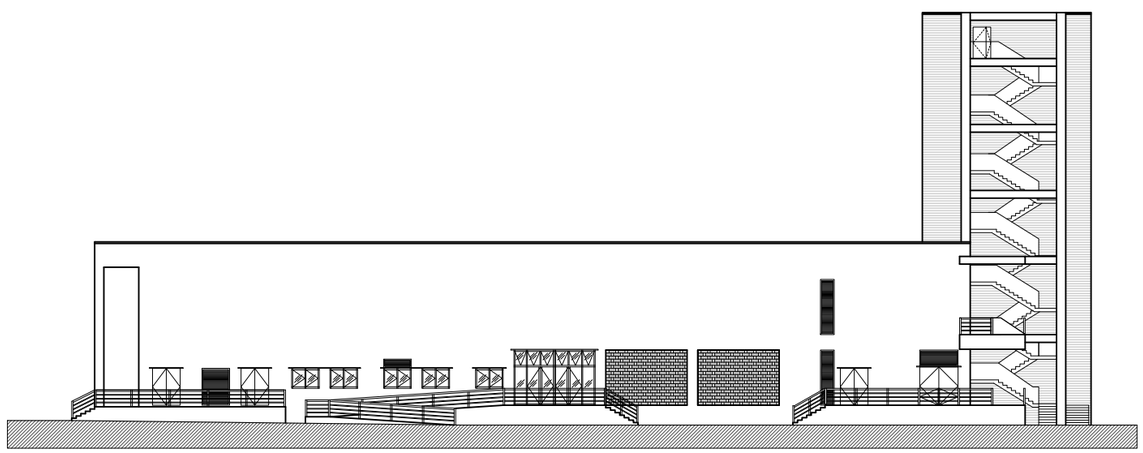
EAST ELEVATION 2



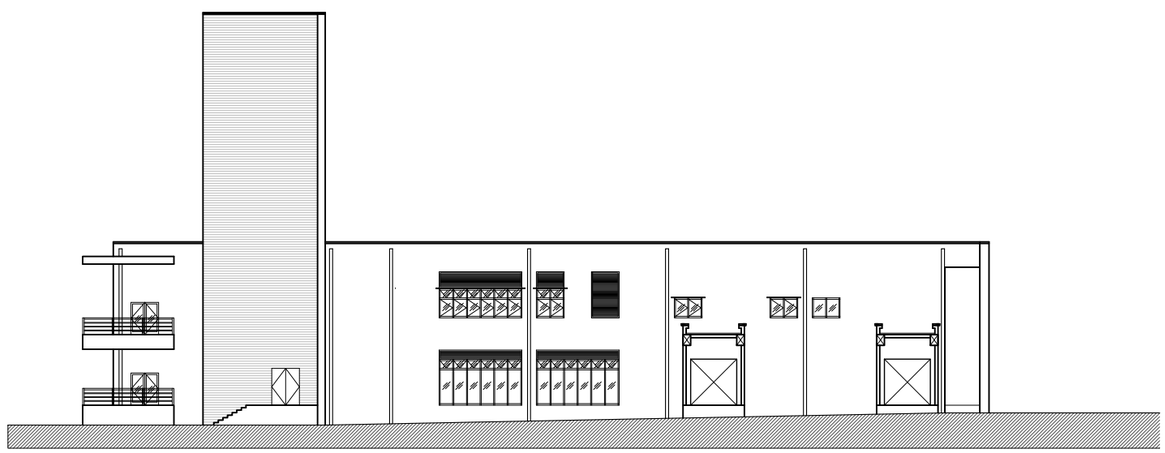
NORTH ELEVATION 1



NORTH ELEVATION 2



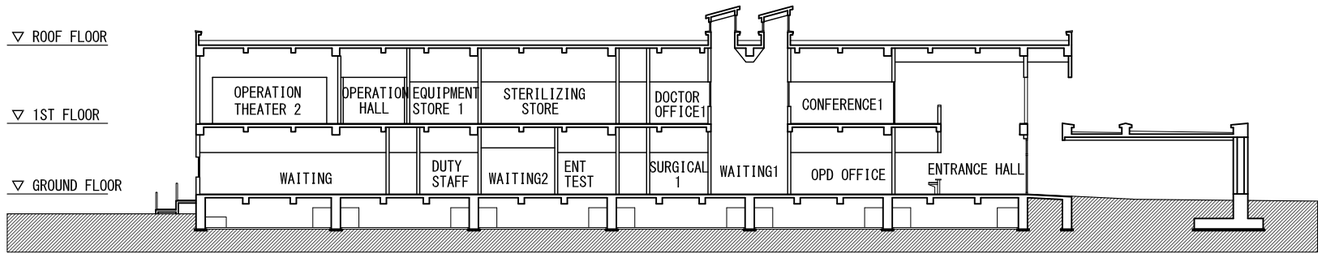
WEST ELEVATION



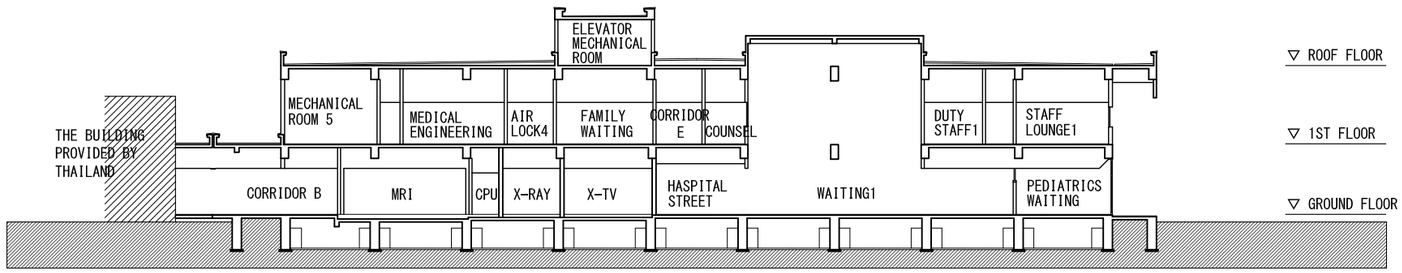
SOUTH ELEVATION

THE PROJECT FOR IMPROVEMENT OF DAWEI GENERAL HOSPITAL

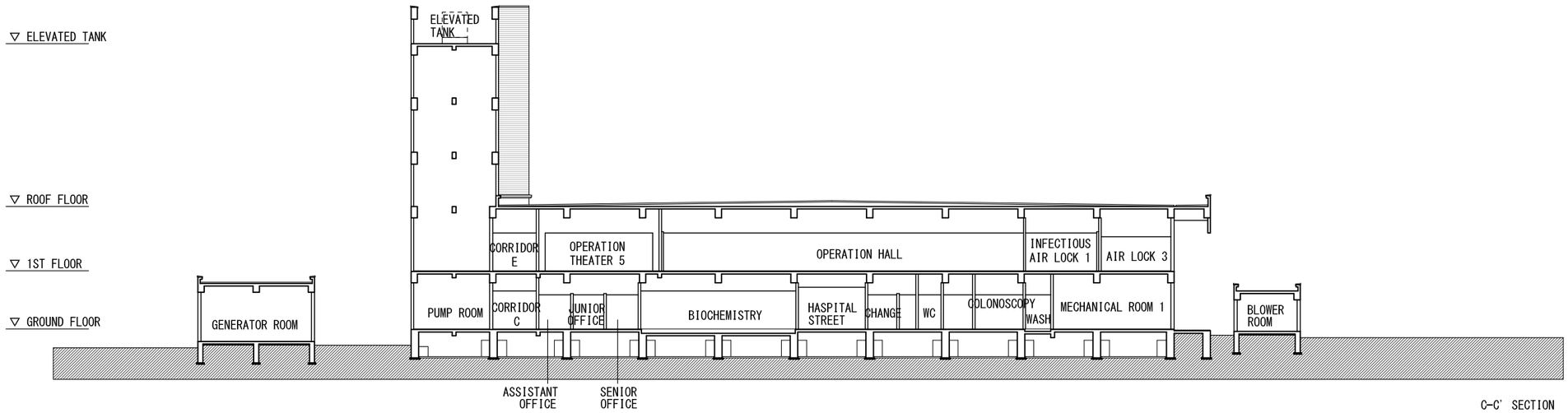
ELEVATION 1/400



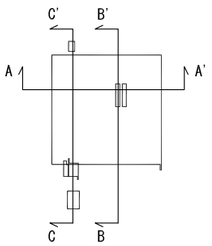
A-A' SECTION



B-B' SECTION



C-C' SECTION



2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The Project will be implemented in accordance with Japanese Grant Aid Scheme. After the Project is approved by the Japanese Cabinet, the Governments of Japan and Myanmar will sign an Exchange of Notes (E/N), which will be followed by the conclusion of a Grant Agreement (G/A) between JICA and the Government of Myanmar. Subsequently, the Government of Myanmar will enter into a consulting services agreement for the Project with a Japanese consulting firm. Then, detailed design drawings and bidding documents will be prepared for the bidding. The Japanese contractor and supplier who will be awarded the relevant contracts will construct facilities and procure and install equipment for the Project.

Those agreements and contracts need to be verified by JICA to become effective under the Grant Aid Scheme.

Once the construction works start, the implementation organization will be formed consisting of the Myanmar side implementing agency, the Japanese consultant, contractor and supplier.

(1) Project Implementation Organization

The Project line agency and the executing agency for the Government of Myanmar for the Project is the Department of Medical Services (DoMS), under MoHS. The responsible official of DoMS will be the authorised signatory of the consultant agreement and the contracts for construction and equipment works. A person in charge of the Project in DoMS and the medical superintendent of DGH will serve as coordinators to manage operations during the implementation of the Project.

(2) Consultant

After the signing of the E/N and G/A, DoMS, MoHS will conclude a consulting services agreement for the Project with a Japanese consulting firm and obtain verification from JICA in accordance with the Grant Aid Scheme. After the agreement is verified, the consultant will prepare detailed design drawings and bidding documents based on this preparatory survey report and meetings with DoMS. Eventually, these documents will be presented to DoMS for review and approval.

For the construction work, the consultant will assist the executing agency with the management of the bidding process and supervision of the construction works based on the detailed design drawings and contract documents. For the equipment procurement and installation, the consultant will also assist with management of bidding process and supervision of delivery, installation, commissioning, and initial equipment operation training. The detailed tasks and responsibilities of the consultant are described as follows:

1) Detailed Design

Based on the preparatory survey report, the consultant will develop detailed design, review the equipment plan, and prepare bidding documents consisting of relevant drawings, technical specifications, instructions to bidders, conditions of contracts for construction works and equipment works. The consultant will also estimate the costs of the construction works and equipment works.

2) Assistance in Bidding

The consultant will assist the executing agency in biddings to select a contractor and a supplier. The consultant will also report the results of the biddings to JICA.

3) Construction and Procurement Supervision

The consultant has the responsibility to ensure that the contractor and the supplier perform their works properly as specified in the contracts of the construction works and equipment works and to give them advice and instructions. The consultant also coordinates all parties concerned from an impartial stance for the smooth implementation of the Project. The major tasks of the consultant are described below:

- Examine and confirm the construction plans, shop drawings, equipment specifications, and other relevant documents submitted by the contractor and supplier;
- Conduct pre-shipment inspection to examine and confirm the quality and performance of the construction materials, furniture, and equipment delivered;
- Ensure that building installations and equipment are delivered and installed and that initial operation training are given and demonstrated;
- Monitor and report the progress of the construction works and equipment works; and
- Attend the commissioning of the completed facilities and equipment.

The consultant will also report the progress of the works, the process of payment, the commissioning of completed facilities and equipment, and other relevant matters to the concerned authorities in Japan, such as JICA.

(3) Contractor and Supplier

The selection of the building contractor and equipment supplier will be through open bidding processes and only qualified Japanese corporations are eligible to participate. In principle, DoMS will award contracts to the lowest bidders of respective biddings for construction works and equipment works. In accordance with the contracts, the contractor will implement construction of facilities, and the supplier will conduct procurement, delivery, and installation of equipment as well as initial operation training for the each equipment to the Myanmar side. Additionally, the supplier is expected to provide logistic support and to coordinate the manufacturers and local agencies so that DGH can continue to procure spare parts and consumable supplies as well as receive professional equipment training even after the handover of the equipment.

(4) JICA

Under the Grant Aid Scheme, JICA will conduct necessary administration for monitoring and promoting the Project implementation as the Project implementing agency of the Government of Japan for the Project.

(5) Local Consultants and Contractors

Considering various tasks for a Japanese resident supervisor, it is advisable to employ responsible local consultants as assistants for construction supervision.

Reliable local contractors with considerable resource and engineering competence can be considered as subcontractors of the Japanese contractor

2-2-4-2 Implementation Conditions

(1) Points to Be Considered for Construction Works

1) Schedule Management

One of the most important points in terms of the schedule management will be works during the rainy season from May to October. The construction plan should be prepared in consideration of the need to avoid flooding over temporary works area including service road, foundation and external works, etc.

2) Safety Management

The construction works will be conducted on the premises of the hospital where medical services will have been provided. To secure safety of patients and medical staff of DGH, security personnel should be deployed at entrances of the premises of the hospital and along internal roads toward the Project site where necessary. Furthermore, the Project site will be temporarily fenced with few gates in order to control circulation of construction equipment, materials and workers.

3) Anti-theft Measures of Materials

To prevent materials from theft, a 24-hour security will be introduced at the Project site.

(2) Points to Be Considered for Equipment Works

The equipment for the Project will include diagnostic imaging equipment such as MRI and CT scanner etc., high pressure steam sterilizers and operation lamps, which require coordination with construction works at the time of installation. Therefore, it is necessary to manage schedule of installation in close coordination among the consultant, the construction contractor, and the equipment supplier.

2-2-4-3 Scope of Works

The Project is implemented by mutual cooperation between the Governments of Japan and Myanmar. The demarcation of responsibilities between the Governments of Japan and Myanmar in the implementation of the Grant Aid Scheme is as follows.

(1) Undertakings by the Government of Japan

The following undertakings on consulting services, construction of facilities, procurement and installation of equipment in the Project are to be provided by the Government of Japan.

1) Consulting Services

- Preparation of detailed design documents of facilities and equipment as well as bidding documents
- Administrative support for bidding procedure for the selection of the contractor and the supplier
- Supervision of construction works and delivery, installation, commissioning, and initial operation training of equipment
- Execution of the Soft Component (Technical & Assistance) for improvement of maintenance capability of medical equipment

2) Facility Construction and Procurement and Installation of Equipment

- Construction of the proposed facilities

・ Procurement of construction materials and equipment of the proposed facilities, and their transportation and delivery to the Project site.
・ Installation, trial run, and adjustment of the equipment procured in the Project
・ Initial operation training of the equipment procured in the Project
・ Maintenance service of equipment covered by the maintenance contract in the Project

(2) Undertakings to be taken by the Government of Myanmar

Undertakings to be taken by the Government of Myanmar are shown in Table 2-20 below.

Table 2-20 Undertakings to be Taken by the Government of Myanmar

Items related to the construction works
Secure the lot of land necessary for the Project
Level the ground of the Project site including demolition of existing buildings and removal of trees
Relocate existing wiring and piping system
Install high voltage lines and a service drop for the new building
Acquire building permit and environmental license
Planting and gardening works around the new building
Construct two connecting corridors
Items related to the equipment procurement
Relocate existing equipment to the new building
Procure and install medical equipment and general furniture other than those provided by the Government of Japan
Items related to operation and maintenance
Procure consumables and spare parts required to maintain the facilities and equipment
Utilize and maintain the facilities and equipment properly and effectively
Secure necessary medical personnel
Bear per diem, accommodation and transportation expense for Soft Component (Technical Assistance) Program attendees
Items related to administration procedures
Bear commissions for the Banking Arrangement (B/A), payment to a consultant, a contractors, and a supplier, Authorization to Pay (A/P) and amended A/P
Obtain permissions, licenses and other authorizations necessary for the Project
Ensure prompt unloading, customs clearance and tax exemption of the construction material and equipment imported for the Project
Exempt the Japanese nationals and corporate entities and parties concerned from third countries engaged in the Project from customs duties, taxes, and any other levies and charges in Myanmar
Make necessary arrangement for the above-mentioned Japanese nationals and parties concerned from third countries to enter into and stay in Myanmar to engage themselves in the Project
Bear all expenses, other than those covered by Japanese Grant budget, necessary for the Project

2-2-4-4 Consultant Supervision

(1) Consultant Supervision

Based on the result of the preparatory survey, the consultant will form a project team to be involved in the whole process of the Project from the detailed design stage to the supervision stage in order to ensure the smooth implementation, in accordance with the guidelines for the Japanese Grant Aid Scheme.

1) Consultant Supervision Policy

The policies for the supervision of the construction works and equipment works of the Project are as follows:

- Keep in close contact with the responsible persons of the relevant agencies of Myanmar and Japan to ensure that the construction of facilities and the installation of equipment will be completed without delay.
- Give prompt and appropriate advice and instructions to the contractor and the supplier from an impartial stance.
- Provide proper advice and instructions on the operation and maintenance of the facilities and equipment after handover

2) Consultant Supervision Plan

In addition to the resident supervisor and local engineers stationed at the Project site, throughout the construction period including defect notification period, engineers in the following fields will be dispatched to Myanmar according to the progress of the construction.

Chief consultant	Overall coordination and supervision of process and quality control
Architect	Explanation of design intent and confirmation of materials
Structural engineer	Confirmation of bearing capacity of piling and structural materials
Mechanical engineer	Explanation of design intent and interim and final inspection of plumbing and air-conditioning works
Electrical engineer	Explanation of design intent and interim and final inspection of electrical works
Engineer for final inspection	Inspection before the expiry of defect notification period, i.e, one year after completion of the construction works

The following engineers will be dispatched during installation and initial operation training of the equipment:

Resident procurement supervisor	Supervision on delivery and installation works Coordination with the building construction works
Procurement supervisor	Preparation work for installation Survey of maintenance contract Mid-term inspection Supervision on initial operation training (operation procedure, daily check, trouble-shooting) Supervision on quantity check and hand over
Inspector for final inspection	Inspection before the expiration of defect notification period, i.e, one year after completion of the equipment works

Confirmation of execution of maintenance work stipulated in a maintenance service contract

3) Procurement Supervision

Procurement supervision services for the equipment works are as follows:

A) Coordination with the supplier and confirmation of equipment production drawings (work in Japan)

The consultant confirms the following items with the supplier and coordinate accordingly:

- Documents required in the contract documents (drawings for manufacturing, layout drawings, utility list, etc.),
- Equipment procurement processes (including ordering, inspection, shipping, transportation, and installation), and
- Equipment suppliers' teams (including human resources, reporting procedure, etc.).

B) Inspection at Manufacturer Factories (work in Japan)

Some items of equipment will be assembled at the manufacturer factories and shipped to the specified warehouse being packed for export. Therefore, inspection of these items will be conducted before packing at the manufacturer factories.

C) Pre-shipment Inspection (work in Japan or third countries)

The consultant will select third party inspection agencies for the pre-shipment inspection; prepare the technical specifications for the inspection and confirm the inspection certificate. The consultant will submit the inspection report to DoMS, MoHS.

D) Procurement supervision (on the Project site)

The consultant will supervise the quantity check, confirmation of procured equipment, installation work, adjustment and commissioning, and initial operation training conducted by the supplier on the Project site. The consultant will also confirm whether manufacturers, models and specifications of the procured equipment meet the equipment work contract. The consultant will confirm the initial operation training attendee lists with name, department, and position of attendees and the completion certificates with instructors' signature. After that, the consultant will submit the acceptance reports of the equipment works to the person in charge of the Project in DoMS, MoHS and complete necessary procedures. The procurement supervisor is responsible for the works mentioned above and he or she will be stationed on the Project site during the period from the commencement of the installation work to acceptance and handing over. At the time of handing over, the procurement supervisor will remind the hospital medical superintendent of the availability of the three-year maintenance service for the CT scanner in order to use of the service before its expiry.

E) Inspection at the end of the defect notification period (on the Project site)

The procured equipment will be inspected before the expiration of defect notification period and an inspection report will be submitted. As for equipment with a maintenance service contract, monitoring

report will be elaborated after confirmation of a record of periodic checks and condition of the equipment.

(2) Construction Management by the Contractor

To complete facilities consistent with the contract documents within the schedule, the contractor will be required to manage the works in collaboration with local contractors smoothly. Understanding the characteristic of the target facilities, the contractor needs to station an experienced construction manager who is familiar with the local conditions in order to materialize the designated quality.

(3) Procurement Management by the Supplier

Works conducted by the supplier are the followings;

1) Confirmation of equipment production drawing (work in Japan)

The supplier will clarify procedures for procurement of equipment (ordering, inspection, loading, transportation and installation) and submit documents required in the contract documents (drawing for manufacturing, layout drawing, utility list, etc.) to the consultants for approval.

2) Inspection at Manufacturer Factories (work in Japan)

The equipment such as image diagnostic equipment will be fully set up at the manufacturer's plant, packaged for export and transferred to designated warehouses. For this reason, the supplier conducts pre-shipment inspection at the manufacturer's plant. Pre-shipment inspections for the other equipment will be conducted at warehouses designated by the manufacturer or by their forwarder.

3) Pre-loading Inspection (work in Japan or third countries)

The supplier will attend pre-shipment inspections conducted by third-party inspection agencies appointed by the consultant. After shipments, the supplier submits photocopies of loading documents (Bill of Lading, insurance policy, invoice and packing list, etc.) to the inspection agencies. Inspection should be conducted at seaport in each procurement country.

4) Procurement supervision (on the Project site)

The supplier will conduct an inventory check and inspection, commissioning and initial operation training as specified in the contract documents. The consultant will supervise these processes with attendance of officials in charge of the Project from DoMS, MoHS and.

2-2-4-5 Quality Control Plan

(1) Construction

To ensure quality construction works, construction supervision is conducted based on the standards commonly applied in Myanmar or Japan.

Table 2-21 shows the quality control plan for major works.

Table 2-21 Quality Control Plan

Work	Control parameter	Control policy	Inspection method	Standard	Inspection frequency	Recording method
Earth work	Slope angle		Gauge, visual inspection		As needed	Photos, inspection documents

Work	Control parameter	Control policy	Inspection method	Standard	Inspection frequency	Recording method
	Leveling tolerance Thickness of replaced soil		Level visual inspection Same as above		Same as above Same as above	Same as above Same as above
Reinforcement work	Reinforcement cover thickness Shape tolerance Tensile test	According to structural plan and spec.	Visual inspection, measurement Same as above Sampling at the work site or at the time of shipment	International standard*	As needed Same as above Every 200t of steel bars of each diameter; three test pieces at each test	Photos, inspection documents Same as above Report
Concrete work	Compression strength Slump value Chloride content Air content Concrete temperature Shape tolerance	According to structural plan and spec.	Test with attendance Test with attendance Test with attendance Test with attendance Test with attendance Measurement	International standard*	3 or more test pieces per batch and every 50m^3 Casting Same as above Same as above Same as above Same as above At the time of form removal	Report Photos, inspection documents Same as above Same as above Same as above Same as above
Plastering, painting, roofing, doors and windows works	Materials, storage methods, work methods, mixing, coating thickness, curing, tolerance	According to technical spec.	Same as left	Same as left	As needed	Photos, inspection documents
Plumbing work	Water supply pipes Drainage pipes	Confirmation of leakage 〃	Water pressure test Water filling test	International standard*	Inspect at the completion of the work	Report
Electrical work	Cables	According to technical spec.	Insulation test Conductivity test	International standard*	Inspect at the completion of the work	Report

*British Standards (BS), American Society for Testing and Materials (ASTM), Japanese Industrial Standards (JIS) and other international standards

(2) Equipment

In order to ensure the quality of medical equipment, Japanese products should be confirmed whether they meet Pharmaceutical Affairs Law (Japan) by examination of Marketing Authorization Holder (MAH) certification.

As for the product in third countries, it will be confirmed whether the product is manufactured in a factory conforming to ISO13485 (International Standards for quality assurance of medical equipment).

2-2-4-6 Procurement Plan

(1) Construction

1) Procurement Policy

Most of major construction materials and equipment for the Project are available in Myanmar, then, in principle, they will be procured locally. On the other hand, materials which are not available in the local market will be procured from Japan or third countries

2) Procurement Plan

A) Structural Work

Sands and aggregates for structural work and concrete blocks for partition walls will be procured locally. The contractor can procure imported deformed bars, structural steels, and cements on the local market, or import those items directly from third countries such as Thailand and/or China etc.

B) Finishing Work

Timbers will be procured locally. The contractor can procure imported aluminum fittings, tiles, metal roof sheets, paint, and glass or import those items directly from third countries such as Thailand and/or China etc.

C) Plumbing Work

The contractor can procure imported pumps, tanks, sanitary appliance, and pipes etc. on the local market or import those items directly from the third countries, such as Thailand and / or China etc.

D) Air Conditioning and Ventilation Work

The contractor can procure imported chiller units, pumps, air conditioners, fans, and conduits etc. on the local market, or import those items directly from the third countries, such as Thailand and / or China etc.

E) Electrical Work

The contractor can procure imported lighting fixtures, power panels, cables/wires, and conduits etc. on the local market, or import those items directly from the third countries, such as Thailand and / or China etc.

F) Labor

Common building laborers will be recruited around Dawei town area. On the other hand, skilled workers will be recruited from big cities such as Yangon.

Table 2-22 shows procurement plan for major construction materials in the Project.

Table 2-22 Procurement Plan for Major Construction Materials

	Procurement location			Note
	Myanmar	Japan	Third countries	
Scaffolding	○		○	Commonly imported from Thailand and China etc.
Temporary fence	○		○	Same as above
Portland cement	○		○	Same as above
Aggregate	○			
Deforming bar	○		○	Commonly imported from Thailand and China etc.
Formwork plywood	○		○	Same as above
Concrete block	○			
Structural steel	○		○	Commonly imported from Thailand and China etc.
Waterproofing material	○		○	Same as above
Light gauge steel	○		○	Same as above
Metal roof sheet	○		○	Same as above
Aluminum fitting	○		○	Same as above
Wooden door and window	○		○	Same as above
Glass	○		○	Same as above
Tile	○		○	Same as above
Acoustic board	○		○	Same as above
Fiber cement board	○		○	Same as above
Paint	○		○	Same as above
Pump	○		○	Same as above
Pipe	○		○	Same as above
Sanitary appliance	○		○	Same as above
Power panel	○		○	Same as above
Cable, wire and conduit	○		○	Same as above
Lighting fixture	○		○	Same as above
Lightning rod	○		○	Same as above
Elevator	○		○	Same as above
Medical gas pipe	○	○	○	Commonly imported from Thailand, China and Japan etc.

(2) Equipment

The equipment in the Project will be basically products made in Japan or Myanmar. If equipment made in third countries is preferred to procure, its procurement will be examined considering its maintenance requirements, and provided it meets the following conditions:

- There is a local agent or branch office in Myanmar and it is possible to provide maintenance services for the product
- There is no product made in Japan or Myanmar which would possibly inhibit competitive biddings.
- The product is generally used in similar medical facilities in Myanmar
- Maintenance costs for spare parts and consumables of the product are inexpensive

The procurement plan for major equipment is shown in Table 2-23.

Table 2-23 The Procurement Plan for Major Equipment

Department	No.	Name	Procurement location		
			Myanmar	Japan	Third countries
Operation Theater Complex	1	Operation lamp A (dual lamp type, for major surgery)		○	○
	2	Operation lamp B (single lamp type, for minor surgery)		○	○
	8	Hand scrub station		○	
	12	Warm cabinet		○	
	14	Film viewer (for two films)		○	
Central Sterile Supply Department	9	High pressure steam sterilizer L		○	
	10	High pressure steam sterilizer M		○	
Diagnostic Imaging Department	4	Dental unit		○	○
	5	ENT unit		○	○
	13	Film viewer (for one film)		○	
Outpatient Department	3	CT scanner		○	○
	6	Fluoroscopy X-ray machine		○	
	7	General X-ray machine		○	
	11	MRI unit		○	○

2-2-4-7 Initial Operation Guidance/Operational Guidance Plan

Subsequent to the delivery, installation, and commissioning of equipment, the supplier will conduct initial and operation training. The consultant will supervise proper implementation of such trainings. The three parties, the representative from DoMS, the consultants and the supplier confirm the training contents and certificate at the time of handover.

2-2-4-8 Soft Component (Technical Assistance) Plan

In order to ensure long-term use of the equipment under the Project and in good condition, a training course will be conducted for the improvement of maintenance management system of medical equipment. The course will be for hospital administrative officers (MS and/or Deputy MS), medical staff in clinical departments, and persons in charge of medical equipment maintenance assigned by MS and other maintenance staff engineers. In addition, the training course will be conducted for the CT scanner and MRI unit covering such topics as how to read and construct images, so that the provided equipment will be able to be used effectively. (See Appendix 5)

2-2-4-9 Implementation Schedule

The Project will take the following steps before commencement of the construction works in accordance with the Grant Aid Scheme of the Government of Japan:

- The Governments of Japan and Myanmar will sign E/N and JICA and the Government of Myanmar will conclude G/A.
- JICA will recommend a Japanese consulting firm who conducted the preparatory survey on the Project

as a project consultant, in principle, to the Government of Myanmar.

- DoMS, as a representative of the Government of Myanmar will enter into consulting services agreement with the consulting firm.
- The detailed design stage will be followed by bidding procedure. After conclusion of contracts, construction works and equipment works will commence.

(1) Detailed Design

Based on the preparatory survey, the consultant will make a detailed plan and bidding documents consisting of detailed design drawings, specifications, instructions to bidders, etc. The consultant will hold consultations with DoMS, MoHS in the initial and final phases of detailed design stage and submit the complete bidding documents for review and approval. Upon their concurrence, detailed design phase will be completed.

(2) Bidding

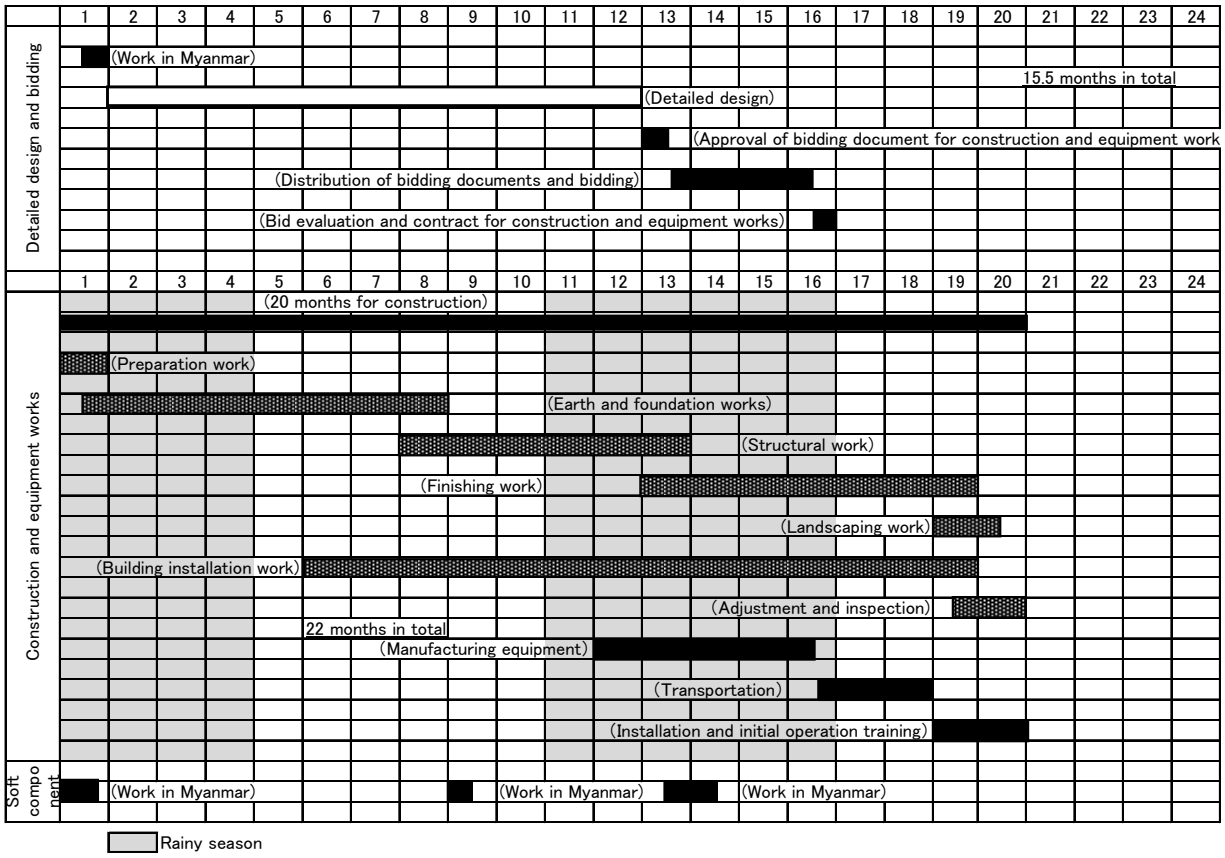
After the completion of the detailed design stage, the prequalification (P/Q) of the bidding for the construction works will be announced and conducted in Japan. Then, DoMS, MoHS will invite the construction companies that meet the P/Q criteria to the bidding. In case that bidding for the equipment works is held separately, DoMS, MoHS will invite equipment supply companies to another bidding. After respective biddings are made properly in the presence of parties concerned, the lowest bidders, whose bids are deemed appropriate, will be awarded the contracts with DoMS, MoHS for construction works and equipment works.

(3) Construction Works and Equipment Works

After the signing of the contracts, the contractor and supplier will obtain verification from JICA to commence construction works and equipment works respectively. Based on the scale of the proposed facilities and conditions of local construction practices, approximately 20 months in total will be required for construction works, procurement and installation of equipment including initial operation training. This prospect presupposes smooth implementation of undertakings by the Myanmar side.

Table 2-24 shows implementation schedule of the Project.

Table 2-24 Project Implementation Schedule



2-3 Obligations of Recipient Country

The Project will be implemented under the Grant Aid Scheme of the Government of Japan. The Government of Myanmar will be responsible for the following tasks.

(1) Items Related to the Construction Works

- Secure the lot of land necessary for the Project
- Level the ground of the Project site including demolition of existing buildings and removal of trees
- Relocate existing wiring and piping system
- Install high voltage lines and a service drop for the new building
- Acquire building permission and environmental license
- Planting and gardening works around the new building
- Construct two connecting corridors

(2) Items Related to the Equipment Procurement

- Relocate existing equipment to the new building
- Procure and install medical equipment and general furniture other than those provided by the Government of Japan

(3) Items Related to Operation and Maintenance

- Procure consumables and spare parts required to maintain the facilities and equipment
- Utilize and maintain the facilities and equipment properly and effectively, and assign necessary medical personnel for operation and maintenance.
- Per diem, accommodation and transportation expense for Soft Component (Technical Assistance) Program attendees

(4) Items Related to Administration Procedures

- Bear commissions for the Banking Arrangement (B/A), payment to the consultant, the contractor, and the supplier, as well as Authorization to Pay (A/P) and amended A/P
- Obtain permissions, licenses and other authorizations necessary for the Project
- Ensure prompt unloading, customs clearance and tax exemption of the construction material and equipment imported for the Project

Tax exemption procedure for imported materials for construction works

- First of all, the contractor will submit a master list (a list of construction materials) and a recommendation letter issued by JICA Myanmar office to the Ministry of Finance through MoHS. Thereafter, tax exemption certificate will be issued from the Ministry of Finance to MoHS. Ministry of Finance will also distribute the tax exemption certificate to concerned custom offices at seaports and/or airports.
- After that, the contractor will submit necessary documents to the custom department in accordance with required formats.

Tax exemption procedure for imported equipment for equipment works

- First of all, the supplier will submit invoice, packing list, insurance policy and concerned contract to the Ministry of Finance through MoHS. Thereafter, tax exemption certificate will be

issued from the Ministry of Finance to MoHS. Ministry of Finance will also distribute the tax exemption certificate to concerned custom offices at seaports and/or airports.

- After that, the supplier will submit invoice, packing list, insurance policy other related documents to the custom department in accordance with required formats.

・Exempt the Japanese nationals and corporate entities and parties concerned from third countries engaged in the Project from customs duties, taxes, and any other levies and charges in Myanmar

・Make necessary arrangements for the above-mentioned Japanese nationals and parties concerned from third countries enter into and stay in Myanmar to engage themselves in the Project

・Bear all expenses, other than those covered by Japanese Grant, necessary for the completion of the Project

2-4 Project Operation Plan

2-4-1 Operation and Maintenance Plan

(1) Operation Structure

To ensure proper utilization of the new facilities and medical equipment provided under the Project and delivery of medical services, deployment of medical personnel required for the upgraded departments in DGH shall be as shown in Table 2-25 . It will be one of the essential conditions to increase the number of medical personnel as there will be more examination rooms of outpatient department and operation theaters after the Project. The required medical personnel include specialists such as surgeons, orthopedic surgeons and anesthesiologists, as well as medicine doctors and surgeons who are able to operate endoscopes, a medical equipment maintenance engineer and nurses. According to “Hospital Management Manual” issued in 2011 by Ministry of Health (as of 2011), deployment of a medical equipment maintenance engineer is mandatory in order to maintain medical equipment operational.

Table 2-25 Medical Personnel Required for the Departments to be Upgraded

Category	Specialty OPD											Operating Theaters						ICU	Sterilization	Endoscopy	Laboratory	Diagnostic imaging Dept.	Pharmacy	Medical record	Medical social	Medical engineer
	Medicine	Obstetrics	Gynecology	Surgery	Orthopedic	Pediatrics	Dental	Psychiatric	Dermatology	Eye	ENT	Surgery	Obstetrics	Orthopedic	ENT	Eye	Anesthesiology									
[Doctors]																										
Senior Consultant							1			1		1	1	1		1	1				1	1				
Junior Consultant								1	1		1	1		1	1		1	2		2	1					
Specialist Assistant Surgeon				1	1								1				1									
Assistant Surgeon	2	1	1	1	1	2	2					2	1	2			2			2	1	1				
Sub Total	2	1	1	2	2	2	3	1	1	1	1	4	3	4	1	1	5	2		4	3	2				
Total	46																									
[Nurses]																										
Chief Nurse												2														
Staff Nurse	2	1	1	2	2	2	1	1	2	1	1	12						4								
Trained nurse	4	2	2	4	4	4	2	2	1	2	2	26						8		2						
Sub Total	6	3	3	6	6	6	3	3	3	3	3	40						12		2						
Total	99																									
[Others]																										
Sterilization worker	1																		2							
Radiology technicians	2																					2				
Laboratory technicians																					25	5				
Medical social worker																								1		
Medical equipment maintenance engineer																										1
Pharmacist																							1			
Assistant pharmacist																							2			
Senior Clark																								2		
Junior Clark																								1		
Worker	4	2	2	4	4	4	2	1	1	1	1	8						3	2	1	2	2	2	2	1	2
Sub Total	7	2	2	4	4	4	2	1	1	1	1	8						3	4	1	25	9	5	5	2	2
Total	96																									
Total Manpower	241																									

(2) Maintenance system

1) Facilities

DGH currently has three facilities maintenance personnel. That is, an electrical technician who is also in charge of plumbing installation and two civil engineers deployed in July 2016 by the Tanintharyi regional office of DoMS. They basically conduct periodic inspection and provide simple maintenance services, while maintenance and repair works which they cannot handle are outsourced through the medical superintendent of DGH. The technicians will be able to conduct daily maintenance works for the new building, however repair of building elements and periodic inspections requiring specialists will be outsourced as is the existing situation.

2) Equipment

DoMS, MoHS in July 2016 assigned one electrical engineer, recently graduated from university. Due to her background, she does not have sufficient knowledge about medical electronics. Thus, in case of equipment malfunction, a repair request is made through the medical superintendent of DGH to CMSD (the Central Medical Stores Depot) under DoMS, MOHS. If CMSD cannot repair the equipment, CMSD calls the local agent for the repairs.

At the completion of the Project, a medical equipment maintenance engineer with adequate knowledge of medical electronics will be deployed to DGH to conduct maintenance activities of medical equipment.

2-4-2 Maintenance Plan

(1) Facilities

There are two categories for maintenance of facilities: (i) daily cleaning and (ii) repair of parts from wear and tear, damage, and deterioration. The daily cleaning will encourage people to use facilities carefully as well as ensure early detection of damages and/or malfunctions. The repair of facilities mainly consists of the restorations and rectifications of deterioration on the interior and exterior finish covering the superstructure. Facilities should be refurbished every decade to retain their functionality. Items for regular inspection and maintenance, which affect the lifespan of facilities, will be in the maintenance manuals provided by the contractor at the commissioning of the facilities. Detailed inspection and cleaning methods will be also explained during the commissioning.

Regular inspection points are summarized in Table 2-26 below.

Table 2-26 Summary of regular inspection points of facilities

	Inspection and maintenance points	Frequency
Exterior	Restore and repaint exterior walls	Repaint every 5 years; Restore every 3 years
	Inspect and restore roofs	Inspect every 3 years; Restore every 10 years
	Clean gutters and drainage surroundings regularly	Every year
	Inspect and repair exterior door and window sealants	Every year
	Inspect and clean ditches, manholes, etc.	Every year

	Inspection and maintenance points	Frequency
Interior	Renovate the interior	As necessary
	Restore and repaint partition walls	As necessary
	Replace ceiling materials	As necessary
	Adjust doors and windows to fit the openings	Every year
	Replace door handles, hinges, etc.	As necessary
	Periodic inspection for elevators	every three months

(2) Building Equipment

For building equipment, it is important to conduct daily "preventive maintenance" not just repair or parts replacement. The length of running time is not the only determinant of the life of equipment; normal operation, daily inspection, lubrication, adjustment, cleaning, maintenance, etc can extend life of equipment. Daily maintenance can prevent problems, accidents and the further deterioration.

Equipment such as a backup generator and water pumps needs periodic inspection and maintenance. It is important for these kinds of equipment to have annual inspection. The general lifespan of major building equipment is shown below in Table 2-27.

Table 2-27 Lifespan of building equipment

	Equipment	Lifespan
Electrical installations	Distribution board	20～30 years
	LED lamp	20,000～40,000 hours
	Fluorescence lamp	5,000～10,000 hours
	Backup generator	30 years
Plumbing installations	Pump, pipe and valve	15 years
	Tank	20 years
	Sanitary appliance	25～30 years
Air conditioning and ventilation installations	Pipe	15 years
	Exhaust fan	20 years
	Air conditioner	10 years

(3) Equipment

The proposed maintenance plan in DoMS, MoHS and DGH is shown in Table 2-28 based on the requirements for the medical equipment and medical furniture maintenance described in the "Hospital Management Manual" issued in 2011 by Ministry of Health and Sports.

Table 2-28 Proposed Maintenance Formation

The scope of DoMS, MoHS	The Scope of Administration department in DGH	The Scope of Maintenance department in DGH
・To create maintenance plan ・To ensure and allocate the budget ・To create personnel deployment plan ・ To create personnel training plan	・To arrange the budget requests from each clinical department and apply them to MoHS ・To apply personnel plan ・To manage inventory list ・To hear the situation	・ To clarify the scope of work of MS/the person in charge of the maintenance/ end-users ・To manage the inventory list of each clinical department ・ To instruct on the equipment usage to end users (including daily check and periodic check) ・ To confirm the lack of parts and consumables

	from each clinical department ・To share the information with MS and other administrators (Regular Report) ・To plan and implement training (Medical staff, Technicians) ・To ask the local agent to repair (Order to manufacturer local agent)	・To report the serious malfunction(to the Administration and ask them to apply the repair request) ・To adjust or repair the equipment with not so serious malfunction ・To identify the malfunction parts ・To inspect the repaired equipment on receipt ・Notes (for each department) Operation Theater : ・To maintain the medical gas station under the supervision of anesthetist, to conduct basic maintenance, ・To maintain medical electronic devices Radiology : ・To maintain the electrical system by Electrician ・To clean up the equipment under the supervision of radiologist Laboratory : ・To call CMSD(Central workshop) in case Blood Bank Refrigerator do not work well, ICU: ・To maintain the medical gas pipe and ICU equipment by qualified technician Laundry : ・To conduct basic maintenance for electrical equipment

Currently there is problem with medical equipment maintenance plan in DGH; daily checks are not following standardized procedures, and are not planned. In this connection, a Soft Component program will be included to improve the maintenance management system.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Estimated Cost to Be Borne by the Government of Myanmar

Estimated costs to be borne by the Government of Myanmar during the Project implementation are shown in Table 2-29 below.

Table 2-29 Estimated Cost to be Borne by the Government of Myanmar

	Item	Estimated cost (thousand MMK)	Estimated cost (thousand JPY)
1)	Level the ground of the Project site including demolition of existing buildings and removal of trees	46,928	3,928
2)	Relocate existing wiring and piping system	5,322	446
3)	Obtain building permit	270,819	22,670
4)	Install high voltage lines and a service drop for the new building	3,630	304
5)	Obtain approval of IEE/EIA	13,690	1,146
6)	Procure and install general funiture	118,401	9,911
7)	Procure and install medical equipment	3,102,294	259,693
8)	Planting and gardening works around the new building	17,919	1,500
9)	Construction of two conecting corridors	752,625	63,002
10)	Per diem, accomodation and transportation expense for Soft Component Program attendees	7,803	653
11)	Allocate medical personnel and employment cost	16,885	1,413
12)	Commissions for Authorization to Pay, payment to a consultant, a contractor, and a supplier	31,758	2,658
	Total	4,388,074	367,324

(2) Conditions for Estimation

Conditions for estimation is assumed as follows:

- Estimation time: April 2017
- Exchange rate: 1USD=114.60JPY
  1MMK=0.08371JPY
- Construction and procurement period: See the Project implementation schedule for the detail design, the bidding, the construction works, and equipment works
- Other: The cost is estimated in accordance with Japanese Grant Aid Scheme

2-5-2 Operation and Maintenance Cost

(1) Operation and Maintenance Cost

Estimated annual operation and maintenance cost for the facilities and equipment is 621,697 thousand MMK as shown in below.

Table 2-30 Estimated operation and maintenance cost (thousand MMK per year)

Item	Estimated expenditures after completion of the Project
1) Human resource	101,310
2) Electricity	60,195

3) Fuel	21,157
4) Medical gas	0
5) Facility maintenance	21,812
6) Medicine	269,273
7) Medical material cost	49,555
8) Consumables for the equipment	48,467
1) Maintenance cost for diagnostic imaging equipment	49,928
Total	621,697

Price escalation rate of 26 %[12] up to 2021, when operation of the facilities and equipment will start is included.

【Basis of Calculation】

1) Human Resource

It is necessary to increase the number of medical staff which would be followed by the increase of personnel cost as shown in Table 2-31 below in order to utilize the facilities and the equipment of the Project and provide required medical services appropriately.

Table 2-31 Estimated Increase of Personnel Cost due to the Project (MMK per year)

Category	Salary paid in 2016[13] (A)	Salary considering price fluctuation (A) x 1.26	Number (person)	Total
surgeon	3,720,000	4,687,000	1	4,687,000
orthopedic surgeon and endoscopist	3,720,000	4,687,000	2	9,374,000
Anesthesiologist	3,720,000	4,687,000	1	4,687,000
Person in charge of medical equipment maintenance	2,160,000	2,722,000	1	2,722,000
nurse	1,980,000	2,495,000	32	79,840,000
Total				101,310,000

2) Electricity

In light of the existing buildings and their electricity charge in DGH, electricity charge for the Project is calculated as follows:

91,032,750MMK x 6,560m^2/12,500m^2 x 1.26 = 60,195 thousand MMK per year

Where it is assumed that electricity charge of DGH in 2016/17 is 91,032,750 MMK, Total floor area of existing buildings in DGH is 12,500m^2 and price escalation rate is 1.26.

[12] Price escalation rate is calculated based on inflation rates of consumer price in the world economic outlook database, April 2017 by IMF (2017-2021)

[13] Personnel costs set by MOH: The data obtained by interview in May 2016

3) Fuel

An assumption is made that the backup generator works half an hour every day. Based on this assumption, the annual fuel cost is calculated as follows:

56L/h x 0.5h x 365days x 1,643MMK /L x 1.26 =21,157 thousand MMK per year

Where it is assumed that fuel consumption of the generator is 56L/h, operation time a day is 0.5 h, unit price of fuel oil is 1,643MMK/L and price escalation rate is 1.26.

4) Medical Gas

Oxygen of medical gas will be provided by existing oxygen generator, therefore no cost will be required.

5) Facility Maintenance

A) Building Repair Cost

Although the building repair cost varies each year, the annual average cost for the first ten years from the completion of the facilities is assumed to be equal to 0.1%[14] of the construction cost of finishing works.

5,841 thousand MMK per year

B) Building Equipment Maintenance Cost

Although the cost is rarely incurred for the first five years from the completion of the facilities, the frequency of replacement of spare parts and defective parts will increase after that. The annual average building equipment maintenance cost for the first ten years is assumed to be equal to 0.2%[15] of the construction cost of building equipment that needs to be replaced.

13,171 thousand MMK per year

C) Elevator Maintenance Cost

Periodic maintenance is fundamental for safety operation of elevators. The annual cost for periodic inspections of two elevators in the new building every three months is as follows:

2,800 thousand MMK per year

Thus, the facility maintenance cost in total 21,812 thousand MMK per year

6) Medicine

In 2016/2017 fiscal year, the cost for the medicine used in DGH was 570,000 thousand MMK. The medicine cost is estimated in the Table 2-32 assuming that the consumption of medicine remains the same level.

[14] Average building repair cost for ten years is assumed to be 0.1% of the construction cost of finishing works, considering maintenance cost of similar buildings.

[15] Average building repair cost for ten years is assumed to be 0.2% of the construction cost of building equipment considering maintenance cost of similar buildings.

Table 2-32 Estimated Medicine Cost for the Project

Annual medicine cost for inpatients	8,446 thousand MMK
Annual medicine cost for outpatients	260,827 thousand MMK
Total	269,273 thousand MMK

It is estimated based on 26% of price fluctuation rate up to 2021 (source: IMF)

Basis of the calculation is as follows;

（medicine cost of inpatient per person 25,012 thousand MMK[16] ）X（Expected annual No. of inpatient in new building 268[17]）X price escalation rate（26%）＝（Annual medicine cost for the new building 8,446,052MMK）

（medicine cost of outpatient per person 6,253 thousand MMK[18] ） X（Expected annual No. of outpatient in new building 33,105[19]）X price escalation rate（26%）＝（Annual medicine cost for the new building 260,827,012MMK）

7) Medical material cost

Medical materials used in the new building are gauze, syringe, catheter, cotton and bandages, etc. for treatment at Operation Theater and ICU. Annual cost is estimated in Table 2-33.

Table 2-33 Annual Medical Material Cost Used in the New Building

Medical material cost	49,555 thousand MMK

It is estimated based on 26% of price fluctuation rate to 2021, source IMF.

8) Consumables for Equipment

The medical equipment utilized in the new building consists of the new equipment procured under the Project and the equipment relocated from the existing buildings and newly procured by the Myanmar side. The consumable cost for these items of equipment is shown in Table 2-34 and Table 2-35 below.

Table 2-34 Consumables for Equipment Newly Procured under the Project

No.	Equipment Name	Consumables	Q'ty (Equipment)	Necessary Q'ty	Unit Cost (MMK)	Total (Unit Cost) (MMK)	Total
3	CT scanner	Disposable injector syringe (for 200ml 50pcs./set)	1	4sets	17,488	69,952	69,952
		14"x17" size dry film（100 sheets/pack)		4sets	33,333	133,332	133,332

[16] Annual medicine cost per inpatient is calculated by the total medicine cost in 2016 divided as the total number of inpatients in 2016.

[17] Assuming that average length of stay is 7.5 days for ICU six beds except one bed for infectious patient, 48.6 patients/bed x 5 beds=244 patients While assuming that average length of stay for infectious patient is double compared with others, 24.3 patients in a year. In total, No. of inpatient for ICU six beds is 268 numbers.。

[18] Annual medicine cost for outpatient is calculated by one fourth of annual medicine cost for inpatients.

[19] No. of outpatient in 2016 was 30,939. Considering population growth rate up to 2024, outpatient No. will increase by 1.07. According to Thematic report on population projections for the Union of Myanmar, states/regions, rural and urban areas, 2014-2050, Myanmar Population and Housing Census, 2014, population of Tanindari region is 1,435 thousand in 2015, 1,498 thousand in 2020, and 1,564 thousand in 2025, respectively. As a result, population growth rate between 2016 and 2024 can be calculated by following way; (1,498 + (1,564-1,498)*4/5)/(1,435 + (1,498-1,435)/5) = 1.07 Thus, outpatient in DGH in 2024 will be 30,939 x 1.07 = 33,105.

No.	Equipment Name	Consumables	Q'ty (Equipment)	Necessary Q'ty	Unit Cost (MMK)	Total (Unit Cost) (MMK)	Total
4	Dental unit	Suction tip for turbine 10 pcs./box	2	8sets	3,333	26,664	53,328
6	Fluoroscopy X-ray unit	14"x17" size dry film（100 sheets/pack)	1	4sets	17,488	69,952	69,952
		14"x14" size dry film（100 sheets/pack)		4sets	17,488	69,952	69,952
7	General X-ray machine	14"x17" size dry film（100 sheets/pack)	1	4 sets	17,488	69,952	69,952
		14"x14" size dry film（100 sheets/pack)		4 sets	17,488	69,952	69,952
8	Hand Scrub station	UV lamp（6pcs./set)	3	4 sets	116,667	466,668	1,400,004
		Filter elements （1u 8pcs./set、0.2u 4pcs./set)		4 sets	260,000	1,040,000	3,120,000
		Brush 48pcs.		4 sets	16,667	66,668	200,004
9	High pressure steam sterilizer LL	Recording paper (6roll/pack)	1	4 sets	33,333	133,332	133,332
		Ink ribbon		4 sets	26,667	106,668	106,668
10	High pressure steam sterilizer M	Recording paper (6 rolls/pack)	1	4 sets	33,333	133,332	133,332
		Ink Ribbon		4 sets	26,667	106,668	106,668
11	MRI unit	14"x17" size dry film（100 sheets/pack)	1	4 sets	17,488	69,952	69,952
13	Film viewer (for one film)	Fluorescent lamp（2pcs./set)	10	3 sets	39,600	118,800	1,188,000
14	Film viewer (for two films)	Fluorescent lamp（2pcs./set)	4	5 sets	39,600	198,000	792,000
Total							7,786,380

Table 2-35 Consumables for Equipment Relocated from the Existing Building

Department	Description	Consumables	Q'ty (Equipment)	Necessary Q'ty	Unit cost (MMK)	Total (Unit cost) (MMK)	Total
Laboratory	Automated Biochemistry analyzer	Reagents for biochemistry tests for 36,000 examinations	1	1 set	3,675,969	3,675,969	3,675,969
	Semi automated chemistry analyzer	Reagents for biochemistry tests for 12,000 examinations	1	1 set	1,225,323	1,225,323	1,225,323
	Electrolyte analyzer	Reagents for electrolyte tests for 1825 examinations	1	1 set	3,354,326	3,354,326	3,354,326
	Spectrophotometer	Reagents for biochemistry tests for 12,000 examinations	1	1 set	1,225,323	1,225,323	1,225,323
	Blood cell counter	Dilution and reagents for 3,500 thousand tests	1	1 set	7,351,942	7,351,942	7,351,942

Department	Description	Consumables	Q'ty (Equipment)	Necessary Q'ty	Unit cost (MMK)	Total (Unit cost) (MMK)	Total
	Centrifuge	Cuvette for measurement for 15 thousand examinations	2	1 set	1,654,186	1,654,186	3,308,372
	Coagulometer	Reagents for measurement for 1000 examinations	1	1 set	551,385	551,385	551,385
	Microscope	Oil and fuse etc.	1	1 set	183,798	183,798	183,798
	ELISA machine	Reagents for measurement for 1000 examinations	1	1 set	735,198	735,198	735,198
	CD4 Blood examination machine	Reagents for measurement for 500 examinations	1	1 set	551,395	551,395	551,395
	Genetic analyzer	Reagents for measurement for 500 examinations	1	1 set	918,992	918,992	918,992
	Microtome	Reusable blade 50 sheets/set	1	5 sets	128,661	643,305	643,305
	Refrigerator	Recording paper	1	1 set	142,138	142,138	142,138
		Refrigerant gas		1 set	71,068	71,068	71,068
	Safety cabinet	Filter 5 sheets/set	1	1 set	73,521	73,521	73,521
		Fluorescent lamp 5pcs		1 set	36,760	36,760	36,760
	Urine analyzer	Strip 100 sheets/set	1	8 sets	11,028	88,224	88,224
	Sterilizer	Door packing		1 set	110,277	110,277	110,277
	Blood bank refrigerator	Recording paper	3	1 set	142,138	142,138	426,414
		Refrigerant gas		1 set	71,068	71,068	213,204
	Platelet incubator with agitator	Cuvette for agitator (100pcs./set)	1	3 sets	89,602	268,806	268,806
		Heater		1 pc.	105,418	105,418	105,418
	Refrigerated centrifuge	Cuvette for measurement (15 thousand tests)	1	1 set	1,654,186	1,654,186	1,654,186
	Hemoglobin meter	Strip for measurement (4500 tests)	1	1 set	496,256	496,256	496,256
Operation Theater	Ultrasound scanner	Recording paper (18m x 10 roll/set)	1	4 sets	29,146	116,584	116,584
		Gel (300g x 12pcs./set)		4 sets	29,146	116,584	116,584
	Patient monitor	Disposable ECG electrode for adult (60 pcs./set)	6	20 sets	2,798	55,960	335,760
		Recording paper (50mm x 30m、100 /box)		4 sets	2,915	11,660	69,960
	Electrosurgical unit	Disposable patient pad (50 pcs./set)	6	1 set	29,146	29,146	174,876
	Infusion pump	Infusion set (100 pcs./pack)	10	1 set	5,829	5,829	58,290

Department	Description	Consumables	Q'ty (Equipment)	Necessary Q'ty	Unit cost (MMK)	Total (Unit cost) (MMK)	Total
	Syringe pump	Syringe 10mL (100 pcs./pack)	10	4 sets	3,031	12,124	121,240
		Syringe 20mL (100 pcs./pack)		4 sets	3,847	15,388	15,3880
		Syringe 30mL (50 pcs./pack)		4 sets	4,080	16,320	163,200
		Syringe 50mL (50pcs. /pack)		4 sets	5,683	22,732	227,320
	Suction unit	Suction bottle 3000ml (with cover) float equipped	6	4 sets	13,990	55,960	335,760
		Suction bottle 3000ml (with cover) no float		4 sets	13,116	52,464	314,784
		Suction tube (with adapter)		4 sets	4,864	19,456	116,736
	Defibrillator	Disposable electrode set (150 pcs./set)	5	4 sets	6,383	25,532	127,660
		Gel (100g x two /set)		4 sets	816	3,264	16,320
		Recording paper (30m/10roll)		4 sets	3,020	12,080	60,400
	Anesthesia apparatus with ventilator	CO2 canister (7.2L/set)	6	12 sets	10,493	125,916	755,496
		Patient breathing circuit (25circuit/set)		4 sets	29,146	116,584	699,504
		Mask (10pcs./ set)		4 sets	12,591	50,364	302,184
ICU	Ultrasound scanner	Recording paper (18m x 10 roll/set)	1	4 sets	29,146	116,584	116,584
		Gel (300g x 12pcs./box)		4 sets	29,146	116,584	116,584
	Defibrillator	Disposable electrode set (150 pcs./set)	1	4 sets	6,383	25,532	25,532
		Gel (100g x two /set)		4 sets	816	3,264	3,264
		Recording paper (30m/10roll)		4 sets	3,020	12,080	12,080
	Patient monitor	Disposable ECG electrode for adult (60 pcs./set)	6	20 sets	2,798	55,960	335,760
		Recording paper (50mm x 30m、100 /box)		4 sets	2,915	11,660	69,960
	Infusion pump	Infusion set (100 pcs./pack)	6	1 set	5,829	5,829	34,974
	Syringe pump	Syringe 10mL (100 pcs./pack)	4	4 sets	3,031	12,124	48,496
		Syringe 20mL (100 pcs./pack)		4 sets	3,847	15,388	61,552
		Syringe 30mL (50 pcs./pack)		4 sets	4,080	16,320	65,280
		Syringe 50mL (50pcs. /pack)		4 sets	5,683	22,732	90,928
	Ventilator	Respiratory circuit tube set (reusable)	4	4 sets	75,780	303,120	1,212,480

Department	Description	Consumables	Q'ty (Equipment)	Necessary Q'ty	Unit cost (MMK)	Total (Unit cost) (MMK)	Total
	Mobile X-ray unit	14"x17" size dry film (100 sheets/pack	1	8 sets	17,488	139,904	139,904
	Suction unit	Suction bottle 3000ml (with cover) float equipped	6	4 sets	13,990	55,960	335,760
		Suction bottle 3000ml (with cover) no float		4 sets	13,116	52,464	314,784
		Suction tube (with adapter)		4 sets	4,864	19,456	116,736
Physiology department	Ultrasound scanner	Recording paper、(18m x 10 roll/set)	2	4 sets	29,146	116,584	233,168
		Gel (300g x 12pcs./box)		4 sets	29,146	116,584	233,168
	ECG	Recording paper (210mm x 30m , 10 roll/set)	1	8 sets	12,241	97,928	97,928
		ECG paste (70g×2pcs./box)		8 sets	874	6,992	6,992
		Disposable ECG electrode for pediatric/adult each 10 set(100pcs. x5/set)		4 sets	6,266	25,064	25,064
	Stress ECG	Recording paper (210mm x 30m , 10 roll/set)	1	8 sets	12,241	97,928	97,928
		ECG paste (70g×2pcs./box)		8 sets	874	6,992	6,992
		Disposable ECG electrode for pediatric/adult each 10 set(100pcs. x5/set)		4 sets	6,266	25,064	25,064
	Mammography unit	Plate for calibration 4 pcs., Pressure plate 1pc.	1	1 set	1,837,986	1,837,986	1,837,986
Endoscopy unit	Bronchoscope	Biopsy forceps 5 pcs. etc.	1	1 set	827,093	827,093	827,093
	Gastrointestinal fiberscope	Biopsy forceps 5 pcs. etc.	1	1 set	827,093	827,093	827,093
	Colonoscope	Biopsy forceps 5 pcs. etc.	1	1 set	827,093	827,093	827,093
	Duodenoscope	Biopsy forceps 5 pcs. etc.	1	1 set	827,093	827,093	827,093
	Electrosurgical unit for duodenoscope	Disposable patient pad (50pcs./set)	1	1 set	29,146	29,146	29,146
Total						32,848,550	40,680,604

The consumable cost for the medical equipment utilized in the new building is shown in Table 2-36.

Table 2-36 Consumable Cost for the Equipment (thousand MMK per year)

The equipment procured under the project	7,786 thousand MMK
The equipment relocated from the existing buildings	40,681 thousand MMK
Total	48,467 thousand MMK

Most of consumables are oversea product and their price is supposed to be stable, thus price escalation rate is not considered in this estimation.

9) Maintenance cost for medical equipment such as Diagnostic Imaging Equipment etc.

Regarding medical equipment maintenance cost for DGH, maintenance contract fee for CT scanner 32 detectors/64 slices and maintenance cost for other medical equipment is 1,200 thousand MMK annually as shown in the table below.

Table 2-37 Medical Equipment Maintenance Cost procured under this project

Description	Q'ty	Unit cost	Amount
CT scanner	1 unit	35,000 thousand MMK	35,000 thousand MMK
Other medical equipment	1 set	1,194 thousand MMK	1,194 thousand MMK
Total			36,194 thousand MMK

Table 2-38 Medical Equipment Maintenance Cost relocated from the Existing Building

(department) description	Q'ty	Unit cost	Amount
(laboratory) Biochemistry analyzer	1 unit	1,792 thousand MMK	1,792 thousand MMK
(ICU) Ventilator	4 units	1,015 thousand MMK	4,060 thousand MMK
(Physiology) Mammography unit	1 unit	1,194 thousand MMK	1,194 thousand MMK
(Endoscope)Bronchoscope	1unit	776 thousand MMK	776 thousand MMK
Gastrointestinal fiberscope	1unit	776 thousand MMK	776 thousand MMK
Colonoscope	1unit	776 thousand MMK	776 thousand MMK
Duodenoscope	1unit	776 thousand MMK	776 thousand MMK
General medical equipment	1set	3,584 thousand MMK	3,584 thousand MMK
Total			13,734 thousand MMK

Table 2-39 Medical Equipment Maintenance Cost

The equipment procured under the project	36,194thousand MMK
The equipment relocated from the existing building	13,734 thousand MMK
Total	49,928 thousand MMK

(2) Feasibility of Budget Allocation to the Operation and Maintenance

Total operation and maintenance cost in DGH in 2020 (expected commencement year of the operation of the new building and equipment) is calculated as shown in Table 2-40 below.

Table 2-40 Total estimated operation and maintenance cost of DGH in 2021 (thousand MMK)

item		2016/17	2019/21
Operation and maintenance cost for existing buildings in DGH		1,514,329	1,908,055[20]
Operation and maintenance cost for the new building and equipment		-	621,697
	Total	1,514,329	2,529,752

It is necessary to maintain annual growth rate of 13.6%[21] or more from budget in 2016/17 in order to accommodate 2,529,752 thousand MMK as total operation and maintenance cost of DGH in 2021. Considering the facts that average annual increase rate in recent five years in expense is approx. 61%, furthermore its budget has sharply increased 3.6 times in recent five years from 2012, it is regarded as reasonable.

Table 2-41 Expense of DGH in recent five years (thousand MMK)

2012/13	2013/14	2014/15	2015/16	2016/17
420,464	740,807	1,088,203	1,709,297	1,514,329

[20] Including 26% of price escalation from 2017 to 2021

[21] $\sqrt[4]{(2,529,752/1,514,329,000)} \fallingdotseq 1.136$

Chapter 3 Project Evaluation

Chapter 3 Project Evaluation

3-1 Preconditions

Since the selected land belongs to the Government of Myanmar, there is no hindrance to the use of land for the Project. However, it is necessary to monitor the Project site, so that it will not be used for other development projects of DGH until the commencement of construction works of the Project. As mentioned in "2-3 Obligations of Recipient Country", the implementation of the Project presupposes smooth execution of undertakings by the Myanmar side. These are demolition of the existing buildings, removal of trees and leveling the ground within the Project site. Also things included are the acquisition of building permission and environment license, installation of high voltage lines and a service drop for the Project site. The Myanmar side will also undertake to procure all medical equipment and general furniture, and so on which won't be provided by the Government of Japan. The Myanmar side will also cover per diem, accommodation and transportation expenses for attendees of the soft component (technical assistance) program, also will ensure tax exemption, and necessary arrangement for issuance of Banking Arrangement (B/A) and Authorization to Pay (A/P). In addition, it is necessary to start construction works for the emergency building by TICA prior to commencement of detailed design of the Project to confirm the exact location of the new building under the Project. Therefore, MoHS shall be responsible for the coordination of implementation schedules of works in TICA side and JICA side.

3-2 Necessary Input by Recipient Country

Following measures shall be taken by the Myanmar side in order to ensure effectiveness of the Project.

- Procurement and/or transfer and re-installation of necessary medical equipment for the new building
- Procurement of necessary consumables and spare parts for facilities and equipment of the Project
- Deployment of necessary medical personnel in DGH in order to utilize and maintain effectively and appropriately facilities and equipment provided under the Project

3-3 Important Assumptions

Following conditions need to be satisfied in order to keep effectiveness of the Project.

- Patients will keep receiving medical services with an affordable cost at DGH as a result of the current reduction policy on out-of-pocket expense implemented by MoHS.
- Some medical personnel including consultants, who are assumed to be necessary for providing appropriate medical services, will be trained and deployed in DGH.
- Construction of the emergency building by TICA will be completed as scheduled.

3-4 Project Evaluation

3-4-1 Relevance

(1) Beneficiaries of the Project

There are two secondary hospitals in Tanintharyi Region, one is DGH located in Dawei district and the other in Myeik district. Considering the catchment area of DGH is northern part of Tanintharyi Region, the number of beneficiaries of the Project are expected to be the whole population in Dawei district and the

northern part of Myeik district (587 thousand)[1].

(2) Contribution to Human Security

It is expected that the service availability among poor and older people would be improved by enhancing medical services of DGH as a regional medical center. From the perspective of human security, the Project would contribute to meeting Basic Human Needs and stabilization of people's wellbeing.

(3) Contribution to Long Term Health Plan in Myanmar

The Project could contribute to the achievement of goals of the long term health plan; "Myanmar Health Vision 2030" whose main goals are such as "Improvement of health condition of the people", "Provision of health services to all people" and "Development of medical personnel", and so on.

(4) Alignment of Policy of Japanese Assistance

The Project coincides with one of important policies of Japanese economic assistance to Republic of the Union of Myanmar (April 2012); "Assistance to improvement of people's life (e.g. healthcare improvement, disaster prevention, assistance to the minority and the poor, agriculture development and regional development). Also as the ninth pillar of Japan-Myanmar Cooperation Program (November, 2016), improvement of health services in states/regions is listed in the item: "Improvement of the health sector which is directly linked to people's lives". Therefore, the Project is consistent with this direction of Japanese cooperation to Myanmar.

3-4-2 Effectiveness

Expected effects of the Project are as follows;

(1) Quantitative Effects

Quantitative indicators of which actual numbers are available as statistical data at the stage of preparatory survey are shown in Table 3-1. Those indicators were selected to confirm the effectiveness of the Project by improving the facilities and equipment.

Table 3-1 Quantitative Indicators and Target Values

Indicators	Baseline (as of 2016) (case)	Target value (in 2024) three years after project completion (case)
The annual No. of examinations with CT	993	1,590
The annual No. of MRI examinations	There is no baseline [2]	427
The annual No. of surgical operations	4,354	5,878

Basis of calculations for the baselines and target values of the qualitative indicators listed below;

[1] According to the 2014 Population and Housing Census, Department of Population, Ministry of Immigration and Population, catchment area of DGH is whole Dawei district (Population: 494 thousand) and Palaw township located in the northern part of Myeik district. (Population: 93 thousand)

[2] Since there is no MRI in DGH at the present time, the baseline is zero.

Baseline	Target value
【1.The annual No. of examinations with CT procured under the Project 】 993 cases in Table 4-1 is No. of cases examined with the existing 16-slice CT in 2016 as reference. After provision of the new CT under the Project, Two CTs are supposed to be utilized in a way that the new CT will be utilized for stroke and emergency cases while the existing CT will be utilized for inpatients.	1) Suppose 50% of trauma patients would be examined with the new CT by considering past experience in DGH. [3] 1,938 x 50%= 969 cases ----------A Where No. of trauma patients in 2024: 1,938[4] 2) According to hospital records, approx. 90% of 479 stroke patients were received CT examination in 2016. Considering population growth in the Region, No. of stroke patients in 2024 is assumed as the following calculation; 479 x 1.44[5] x 0.9 ≒ 621 cases----------B Therefore, the annual No. of examinations with CT procured under the Project will be A + B = 1,590 cases
【2. The annual No. of MRI examinations 】 Since there is no MRI in DGH at the present time, the baseline is zero.	Diagnosis with CT scanner is performed for stroke patient at first, but it is necessary to perform MRI examination for patient suspected with cerebral infarction. No. of MRI examinations for stroke patients can be calculated as follows. 1) For weekday 244 days x 1.5 cases (average number of diagnosis per day) = 366 cases--------A 2) For weekend and holiday 121 days（weekend 104 days＋Myanmar holiday 17 days) x 0.5 cases (average number of diagnosis per day)＝ 61cases--------B In this case, diagnosis will be for mainly emergency case such as head or spine on weekend and holiday. Thus the number is assumed to be one-third of the weekday.) Therefore, the annual No. of MRI examinations in 2024 will be A + B = 427 cases
【3. The annual No. of surgical operations】 4,354 operations were performed in 2016. (surgery:1,676, obstetrics/gynecology: 1,334, orthopedics:489, ENT:63 and ophthalmology:792)	It is assumed that No. of operations will increase 35% as sanctioned No. of beds will increase 35% from 370 to 500. Thus, 4,354 cases x 1.35≒ 5,878 case

[3] Total No. of CT examinations in 2016 was 993 cases. No. of CT examinations for trauma patients in 2016 was calculated as 560 cases deducting 433 of stroke cases from the total. Therefore, rates of application of CT examinations on trauma patients is assumed to be 560/1812x100≒31%.

[4] According to "Thematic report on population projections for the Union of Myanmar, states/regions, rural and urban areas, 2014-2050, Myanmar Population and Housing Census, 2014", the population of the Tanintharyi Region in 2016 and 2024 are 1.447 million and 1.551 million respectively. Therefore, population growth from 2016 to 2024 can be calculated as follows; 1.551 / 1.447 ≒ 1.07 Thus, trauma patients in 2024 is assumed as follows;
1,812 x 1.07 ≒ 1,939 cases ･･･ trauma patients in 2024
Where No. of trauma patients in 2016: 1,812

[5] According to "Thematic report on population projections for the Union of Myanmar, states/regions, rural and urban areas, 2014-2050, Myanmar Population and Housing Census, 2014", the population aged 65 and over in the Tanintharyi Region in 2016 and 2024 are 74 thousand and 104 thousand respectively. Therefore, population growth from 2016 to 2024 can be calculated as follows;
104 / 74 ≒ 1.41

(2) Qualitative Effects

Expected qualitative effects of the Project are shown in Table 3-2. A questionnaire survey to medical personnel and medical students at DGH will be conducted for the confirmation of the effects after completion of the Project. Respondents, who would have been working for DGH before the Project, will be requested to answer comparing conditions of DGH before and after the Project. Other respondents, who would be deployed to work at DGH after the Project, will be requested to answer comparing the hospital with other similar hospitals where they worked.

Table 3-2 Qualitative Effects

1. Emergency patients get effectively treated through improved patient and staff flow including swift patient transfer to the new CT room and operation theater complex.
2. Operations in the clean environment are performed with the operation theater complex.
3. Diagnostic capacity at DGH is enhanced through the improvement of medical and health care services.
4. Clinical practice environment is improved at DGH through equipment and building construction.
5. The health indicators (MMR, U5MR, and IMR) in Tanintharyi region show an improving trend.

Appendices

1. Member List of the Survey Team
2. Survey Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions
5. Soft Component (Technical Assistance) Plan
6. Other Relevant Data
7. References

1. Member List of the Survey Team

Field Survey 1-1: 10th of January - 6th of February, 2016

Position	Name	Organization
Team Leader	Mr. Taro KIKUCHI	Japan International Cooperation Agency
Coordinator	Ms. Aki HASHIZUME	Japan International Cooperation Agency
Advisor for Medical Services	Ms. Kaori OHARA	National Center for Global Health and Medicine
Project Manager / Architectural Planning	Mr. Hiroaki MOCHIZUKI	Yamashita Sekkei Inc.
Deputy Project Manager / Architectural Planning	Mr. Shingo KURODA	Yamashita Sekkei Inc.
Architectural Design 1-a / Natural Condition Surveys	Mr. Kohei NISHIKAWA	Yamashita Sekkei Inc.
Architectural Design 1-b	Mr. Mineo NAGAOKA	Yamashita Sekkei Inc.
Architectural Design 2	Ms. Fei Kai SHUM	Yamashita Sekkei Inc.
Structural Design 1	Mr. Lennie Naing	Yamashita Sekkei Inc.
Structural Design 2	Mr. Win Min Oo	Yamashita Sekkei Inc.
Mechanical Planning 2	Mr. Norikazu KAMEDA	Yamashita Sekkei Inc.
Mechanical Planning 1	Mr. Anthony AGRIFOGLIO	Yamashita Sekkei Inc.
Construction Planning / Cost Survey 1	Mr. Motoharu YOKOYAMA	Yamashita Sekkei Inc.
Equipment Planning / Operation & Management Planning	Ms. Yasuko ASANUMA	Binko International Ltd.
Procurement Planning / Cost Survey	Mr. Naoki KAYANO	Binko International Ltd.
Health and Medical Care Planning	Ms. Akiko OKITSU	Binko International Ltd.

Field Survey 1-2: 22nd of February - 27th of February, 2016

Position	Name	Organization
Coordinatior	Ms. Aki HASHIZUME	Japan International Cooperation Agency
Advisor for Medical Services	Ms. Kaori OHARA	National Center for Global Health and Medicine
Project Manager / Architectural Planning	Mr. Hiroaki MOCHIZUKI	Yamashita Sekkei Inc.
Architectural Design 1-a / Natural Condition Surveys	Mr. Kohei NISHIKAWA	Yamashita Sekkei Inc.
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Field Survey 2-1: 21st of February - 19th of March, 2016

Position	Name	Organization
Project Manager / Architectural Planning	Mr. Hiroaki MOCHIZUKI	Yamashita Sekkei Inc.
Deputy Project Manager / Architectural Planning	Mr. Shingo KURODA	Yamashita Sekkei Inc.
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Structural Design 1	Mr. Lennie Naing	Yamashita Sekkei Inc.
Structural Design 2	Mr. Win Min Oo	Yamashita Sekkei Inc.
Mechanical Planning 1	Mr. Akikazu SUGIYAMA	Yamashita Sekkei Inc.
Electrical Planning 1	Mr. Anthony AGRIFOGLIO	Yamashita Sekkei Inc.
Electrical Planning 2	Mr. Fumihiko HIRENZAKI	Yamashita Sekkei Inc.
Construction Planning / Cost Survey 1	Mr. Motoharu YOKOYAMA	Yamashita Sekkei Inc.
Construction Planning / Cost Survey 2	Ms. Yuka KOBAYASHI	Yamashita Sekkei Inc.
Equipment Planning / Operation & Management Planning	Ms. Yasuko ASANUMA	Binko International Ltd.
Procurement Planning / Cost Survey	Mr. Naoki KAYANO	Binko International Ltd.
Health and Medical Care Planning	Ms. Akiko OKITSU	Binko International Ltd.

Field Survey 2-2: 31st of March - 4th of April, 2017

Position	Name	Organization
Coordinator	Mr Nobo IWAI	Japan International Cooperation Agency
Project Manager / Architectural Planning	Mr. Hiroaki MOCHIZUKI	Yamashita Sekkei Inc.
Architectural Design 1-a / Natural Condition Surveys	Mr. Kohei NISHIKAWA	Yamashita Sekkei Inc.
Structural Design 2	Mr. Win Min Oo	Yamashita Sekkei Inc.

Field Survey 2-3: 11th of June - 15th of June, 2017

Position	Name	Organization
Structural Design 2	Mr. Win Min Oo	Yamashita Sekkei Inc.
Health and Medical Care Planning	Ms. Akiko OKITSU	Binko International Ltd.

Explanation of Draft Final Report for Dawei General Hospital:
15th of July - 22nd of July, 2017

Position	Name	Organization
Team Leader	Mr. Taro KIKUCHI	Japan International Cooperation Agency
Coordinator	Ms. Etsuko NAKAMURA	Japan International Cooperation Agency
Project Manager / Architectural Planning	Mr. Hiroaki MOCHIZUKI	Yamashita Sekkei Inc.
Deputy Project Manager / Architectural Planning	Mr. Shingo KURODA	Yamashita Sekkei Inc.
Equipment Planning / Operation & Management Planning	Ms. Yasuko ASANUMA	Binko International Ltd.
Structural Design 2	Mr. Win Min Oo	Yamashita Sekkei Inc.

2. Survey Schedule

ıнuary - 6th of February, 2016

			JICA Officials & Advisor	Project Manager / Architectural Planning	Deputy Project Manager / Architectural Planning	Architectural Design 1-a / Natural Condition Surveys	Architectural Design 1-b	Architectural Design 2	Structural Design 1	Structural Design 2	Mechanical Planning 2	Mechanical Planning 1	Construction Planning / Cost Survey 1	Equipment Planning / Operation & Management Planning	Procurement Planning / Cost Survey	Health and Medical Care Planning
			Mr. Hiroaki MOCHIZUKI		Mr. Shingo KURODA	Mr. Kohei NISHIKAWA	Mr. Mineo NAGAOKA	Ms. Fei Kai SHUM	Mr. Lennie Naing	Mr. Win Min Oo	Mr. Norikazu KAMEDA	Mr. Anthony AGRIFOGLIO	Mr. Motoharu YOKOYAMA	Ms. Yasuko ASANUMA	Mr. Naoki KAYANO	Ms. Akiko OKITSU
1	10 Jan	Sun	TKO-> YGN			TKO-> YGN			BGN-> YGN		TKO-> YGN					
2	11 Jan	Mon	->NPT MTG w/ MoHS			->DWI SVY & MTG in MgGH & RHD	->MWY SVY & MTG in MgGH		->DWI SVY & MTG in MgGH & RHD	->NPT MTG w/ MoHS	->DWI SVY & MTG in MgGH & RHD		->MWY SVY & MTG in MgGH	->NPT MTG w/ MoHS	->MWY SVY & MTG in MgGH	->NPT MTG w/ MoHS
3	12 Jan	Tue	MTG in NPT, ->YGN	->MWY SVY & MTG in MgGH		SVY & MTG in DGH	SVY & MTG in MgGH		SVY & MTG in MgGH	->MWY SVY & MTG in MgGH	SVY & MTG in DGH, IVW w/ Local Firms & Authorities		SVY & MTG in MgGH, IVW w/ Local Firms	->MWY SVY & MTG in MgGH	SVY & MTG in MgGH	->MWY SVY & MTG in MgGH
4	13 Jan	Wed	->MWY	SVY & MTG in MgGH, IVW w/ Local Firms & Authorities		SVY & MTG in DGH, IVW w/ Local Firms & Authorities	SVY & MTG in MgGH, IVW w/ Local Firms & Authorities		SVY & MTG in DGH, IVW w/ Local Firms & Authorities	SVY & MTG in MgGH	SVY & MTG in DGH, IVW w/ Local Firms & Authorities		SVY & MTG in MgGH, IVW w/ Local Firms	SVY & MTG in MgGH		
5	14 Jan	Thu	MTG in MgGH			SVY & MTG in DGH, IVW w/ Local Firms & Authorities	SVY & MTG in MgGH, IVW w/ Local Firms & Authorities		SVY & MTG in DGH, IVW w/ Local Firms & Authorities	MTG in MgGH	SVY & MTG in DGH, IVW w/ Local Firms & Authorities		SVY & MTG in MgGH, IVW w/ Local Firms & Authorities	MTG in MgGH	SVY & MTG in MgGH	MTG in MgGH
6	15 Jan	Fri	MTG in MgGH			SVY & MTG in DGH, IVW w/ Local Firms & Authorities	SVY & MTG in MgGH, IVW w/ Local Firms & Authorities		SVY & MTG in DGH, IVW w/ Local Firms & Authorities	MTG in MgGH	SVY & MTG in DGH, IVW w/ Local Firms & Authorities		SVY & MTG in MgGH, IVW w/ Local Firms & Authorities	MTG in MgGH	SVY & MTG in MgGH	MTG in MgGH
7	16 Jan	Sat	-> YGN			SVY in DGH	SVY in MgGH		SVY in DGH	->YGN	SVY in DGH		SVY in MgGH	->YGN		
8	17 Jan	Sun	-> DWI		TKO-> YGN	Team MTG				->DWI	Team MTG			-> DWI		
9	18 Jan	Mon	MTG in DWI			SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN		SVY & MTG in DGH	MTG in DWI	SVY & MTG in DGH, IVW w/ Local Firms & Authorities		SVY & MTG in MgGH	MTG in DWI		
10	19 Jan	Tue	MTG in DWI ->YGN			SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN		SVY & MTG in DGH	MTG in DWI		SVY & MTG in DGH, IVW w/ Local Firms & Authorities	SVY & MTG in MgGH	MTG in DWI ->YGN	SVY & MTG in DGH	MTG in DWI
11	20 Jan	Wed	->NPT MTG w/ MoHS			SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN		SVY & MTG in DGH	SVY & MTG in DGH			SVY & MTG in MgGH	->NPT MTG w/ MoHS	SVY & MTG in DGH	
12	21 Jan	Thu	MTG w/ MoHS ->YGN			SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN		SVY & MTG in DGH	SVY & MTG in DGH			SVY & MTG in MgGH	MTG w/ MoHS ->NPT	SVY & MTG in DGH ->YGN	SVY & MTG in DGH
13	22 Jan	Fri	Team MTG, MTG w/ JEOJ YGN->			SVY & MTG in DGH, PLN	->YGN->	SVY & MTG in MgGH, PLN	SVY & MTG in DGH	SVY & MTG in DGH			SVY & MTG in MgGH	Team MTG, MTG w/ EOJ	IVW w/ local firms YGN->	SVY & MTG in DGH
14	23 Jan	Sat	->TKO	->DWI SVY in DGH	-> MWY SVY in MgGH	SVY in DGH	->TKO	SVY in MgGH	SVY in DGH	SVY in DGH			SVY in MgGH	-> DWI SVY in DGH	-> TKO	SVY in DGH
15	24 Jan	Sun		Team MTG				Team MTG	YGN- >MWY	Team MTG			Team MTG			Team MTG
16	25 Jan	Mon		SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN	SVY & MTG in DGH, PLN		SVY & MTG in MgGH, PLN	SVY & MTG in MgGH	SVY & MTG in DGH			SVY & MTG in MgGH	SVY & MTG in DGH		SVY & MTG in DGH

			JICA Officials & Advisor	Project Manager / Architectural Planning	Deputy Project Manager / Architectural Planning	Architectural Design 1-a / Natural Condition Surveys	Architectural Design 1-b	Architectural Design 2	Structural Design 1	Structural Design 2	Mechanical Planning 2	Mechanical Planning 1	Construction Planning / Cost Survey 1	Equipment Planning / Operation & Management Planning	Procurement Planning / Cost Survey	Health and Medical Care Planning
				Mr. Hiroaki MOCHIZUKI	Mr. Shingo KURODA	Mr. Kohei NISHIKAWA	Mr. Mineo NAGAOKA	Ms. Fei Kai SHUM	Mr. Lennie Naing	Mr. Win Min Oo	Mr. Norikazu KAMEDA	Mr. Anthony AGRIFOGLIO	Mr. Motoharu YOKOYAMA	Ms. Yasuko ASANUMA	Mr. Naoki KAYANO	Ms. Akiko OKITSU
17	26 Jan	Tue		SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN	SVY & MTG in DGH, PLN		SVY & MTG in MgGH, PLN	SVY & MTG in MgGH	SVY & MTG in DGH			SVY & MTG in MgGH	SVY & MTG in DGH		SVY & MTG in DGH
18	27 Jan	Wed		MTG in DGH ->YGN	MTG in MgGH ->NPT	MTG in DGH ->YGN		MTG in MgGH ->NPT	SVY & MTG in MgGH	MTG in DGH ->YGN	SVY & MTG in DGH		SVY & MTG in MgGH	MTG in DGH ->YGN		MTG in DGH ->YGN
19	28 Jan	Thu		->NPT MTG w/ MoHS	MTG w/ MoHS	->NPT MTG w/ MoHS		MTG w/ MoHS	SVY & MTG in MgGH	->NPT MTG w/ MoHS	SVY & MTG in DGH		SVY in MgGH ->YGN->	->NPT MTG w/ MoHS		->NPT MTG w/ MoHS
20	29 Jan	Fri		->YGN Survey in YGN YGN->				->YGN SVY in YGN YGN->	SVY & MTG in MgGH	->Yangon SVY in Yangon	SVY in DGH ->Yangon->		SVY in YGN	->YGN SVY in YGN YGN->		->YGN SVY in YGN YGN->
21	30 Jan	Sat		->TKO				->TKO	SVY in MgGH ->YGN	SVY in YGN	->TKO		SVY in YGN	->TKO		->TKO
22	31 Jan	Sun							->DGH	DOC			DOC			
23	1 Feb	Mon							SVY & MTG in DGH				SVY in YGN YGN->			
24	2 Feb	Tue							SVY & MTG in DGH				->TKO			
25	3 Feb	Wed							SVY & MTG in DGH							
26	4 Feb	Thu							SVY & MTG in DGH							
27	5 Feb	Fri							SVY in DGH ->YGN->							
28	6 Feb	Sat							->BGN							

Field Survey 1-2: 22nd of February - 27th of February, 2016

			JICA Official & Advisor	Project Manager / Architectural Planning	Architectural Design 1-a / Natural Condition Surveys	Equipment Planning / Operation & Management Planning
				Mr. Hiroaki MOCHIZUKI	Mr. Kohei NISHIKAWA	Ms. Yasuko ASANUMA
1	22 Feb	Mon	TKO->BKK			
2	23 Feb	Tue	MTG w/ TICA, Pahol Hospital in Kanchanaburi Province			
3	24 Feb	Wed	Team MTG ->NPT			
4	25 Feb	Thu	MTG w/ MoHS			
5	26 Feb	Fri	Team MTG ->BKK->		->YGN SVY in YGN ->BKK->	
6	27 Feb	Sat	->TKO			

Field Survey 2-1: 21st of February - 19th of March, 2016

			Project Manager / Architectural Planning	Deputy Project Manager / Architectural Planning	Architectural Design 1-a / Natural Condition Surveys	Architectural Design 1-b	Architectural Design 2	Structural Design 1	Structural Design 2	Mechanical Planning 1	Electrical Planning 1	Electrical Planning 2	Construction Planning / Cost Survey 1	Construction Planning / Cost Survey 2	Equipment Planning / Operation & Management Planning	Procurement Planning / Cost Survey	Health and Medical Care Planning
			Mr. Hiroaki MOCHIZUKI	Mr. Shingo KURODA	Mr. Kohei NISHIKAWA	Mr. Mineo NAGAOKA	Ms. Fei Kai SHUM	Mr. Lennie Naing	Mr. Win Min Oo	Mr. Akikazu SUGIYAMA	Mr. Anthony AGRIFOGLIO	Mr. Fumihiko HIRENZAKI	Mr. Motoharu YOKOYAMA	Ms. Yuka KOBAYASHI	Ms. Yasuko ASANUMA	Mr. Naoki KAYANO	Ms. Akiko OKITSU
1	21 Feb	Sun				TKO->YGN							TKO->YGN			TKO->YGN	
2	22 Feb	Mon				->MWY MTG in MgGH		->MWY MTG in MgGH					->MWY MTG in MgGH			->MWY MTG in MgGH	
3	23 Feb	Tue				SVY & MTG in MgGH							SVY & MTG in MgGH			SVY & MTG in MgGH	
4	24 Feb	Wed				SVY & MTG in MgGH								SVY & MTG in MgGH		SVY & MTG in MgGH	
5	25 Feb	Thu				SVY & MTG in MgGH								SVY & MTG in MgGH		SVY & MTG in MgGH	
6	26 Feb	Fri				SVY & MTG in MgGH								SVY & MTG in MgGH		SVY & MTG in MgGH	
7	27 Feb	Sat				SVY in MgGH								SVY in MgGH		SVY in MgGH	
8	28 Feb	Sun				Team MTG				TKO->YGN		TKO->YGN		Team MTG		Team MTG	FOK ->YGN
9	29 Feb	Mon		TKO->YGN		SVY & MTG in MgGH			->MWY SVY & MTG in MgGH			->MWY SVY & MTG in MgGH		SVY & MTG in MgGH		SVY & MTG in MgGH	->MWY SVY & MTG in MgGH
10	1 Mar	Tue		SVY in YGN ->MWY		SVY & MTG in MgGH						SVY & MTG in MgGH		SVY & MTG in MgGH		SVY & MTG in MgGH	
11	2 Mar	Wed		SVY & MTG in MgGH		SVY & MTG in MgGH						SVY & MTG in MgGH		Natural Condition SVYs		SVY & MTG in MgGH	

			Project Manager / Architectural Planning	Deputy Project Manager / Architectural Planning	Architectural Design 1-a / Natural Condition Surveys	Architectural Design 1-b	Architectural Design 2	Structural Design 1	Structural Design 2	Mechanical Planning 1	Electrical Planning 1	Electrical Planning 2	Construction Planning / Cost Survey 1	Construction Planning / Cost Survey 2	Equipment Planning / Operation & Management Planning	Procurement Planning / Cost Survey	Health and Medical Care Planning
			Mr. Hiroaki MOCHIZUKI	Mr. Shingo KURODA	Mr. Kohei NISHIKAWA	Mr. Mineo NAGAOKA	Ms. Fei Kai SHUM	Mr. Lennie Naing	Mr. Win Min Oo	Mr. Akikazu SUGIYAMA	Mr. Anthony AGRIFOGLIO	Mr. Fumihiko HIRENZAKI	Mr. Motoharu YOKOYAMA	Ms. Yuka KOBAYASHI	Ms. Yasuko ASANUMA	Mr. Naoki KAYANO	Ms. Akiko OKITSU
12	3 Mar	Thu		SVY & MTG in MgGH, IVW w/ Authorities		->YGN	SVY & MTG in MgGH, IVW w/ Authorities					SVY & MTG in MgGH, IVW w/ Authorities		Natural Condition SVYs		SVY & MTG in MgGH	
13	4 Mar	Fri		SVY & MTG in MgGH		SVY in YGN YGN->	SVY & MTG in MgGH					SVY & MTG in MgGH		SVY & MTG in MgGH		SVY & MTG in MgGH	
14	5 Mar	Sat		SVY in MgGH		->TKO	SVY in MgGH					SVY in MgGH		SVY in MgGH		SVY in MgGH ->YGN	SVY in MgGH
15	6 Mar	Sun	TKO->YGN	Team MTG	TKO->YGN		Team MTG	SVY in MgGH ->YGN			TKO->YGN	SVY in MgGH ->YGN		Team MTG	TKO->YGN	->DWI SVY in DGH	SVY in MgGH ->YGN
16	7 Mar	Mon	->DWI SVY & MTG in DGH	SVY & MTG in MgGH, PLN	->DWI SVY & MTG in DGH		SVY & MTG in MgGH, PLN	->DWI SVY & MTG in DGH						SVY & MTG in MgGH, PLN	->MWY SVY & MTG in MgGH	SVY & MTG in DGH	->DWI SVY & MTG in DGH
17	8 Mar	Tue	SVY & MTG in DGH	SVY & MTG in MgGH, PLN	SVY & MTG in DGH		SVY & MTG in MgGH, PLN	Natural Condition SVYs	SVY & MTG in DGH	SVY & MTG in DGH, IVW w/ Authorities				SVY & MTG in MgGH, PLN	SVY & MTG in MgGH	SVY & MTG in DGH ->YGN	SVY & MTG in DGH
18	9 Mar	Wed	SVY & MTG in DGH, IVW w/ Authorities	SVY & MTG in MgGH, PLN	SVY & MTG in DGH, IVW w/ Authorities		SVY & MTG in MgGH, PLN	SVY & MTG in DGH, IVW w/ Authorities	SVY & MTG in DGH	SVY & MTG in DGH, IVW w/ Authorities				SVY & MTG in MgGH, PLN	SVY & MTG in MgGH	IVW w/ local firms	SVY & MTG in DGH
19	10 Mar	Thu	SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN	SVY & MTG in DGH, PLN		PLN ->YGN	SVY & MTG in DGH, IVW w/ Authorities	SVY & MTG in DGH	SVY & MTG in DGH, IVW w/ Authorities				SVY & MTG in MgGH, PLN	SVY & MTG in MgGH	IVW w/ local firms, MTG w/ CMSD	SVY & MTG in DGH ->YGN
20	11 Mar	Fri	SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN	SVY & MTG in DGH, PLN		SVY in YGN YGN->	SVY & MTG in DGH	SVY & MTG in DGH	SVY in DGH ->YGN->				SVY & MTG in MgGH, PLN	SVY & MTG in MgGH	IVW w/ local firms YGN->	SVY in YGN YGN->
21	12 Mar	Sat	SVY in DGH, PLN	SVY in MgGH, PLN	SVY in DGH, PLN		TKO	SVY in DGH ->YGN	SVY in DGH	->TKO				SVY in MgGH, PLN	SVY in MgGH ->YGN	TKO	FOK
22	13 Mar	Sun	Team MTG, PLN	Team MTG, PLN	Team MTG, PLN			->BGN	SVY in DGH					Team MTG, PLN	->DWI SVY in DGH		
23	14 Mar	Mon	SVY & MTG in DGH, PLN	SVY & MTG in MgGH, PLN	SVY & MTG in DGH, PLN				SVY & MTG in DGH					->YGN	SVY & MTG in DGH		
24	15 Mar	Tue	MTG in DGH ->YGN	MTG in MgGH ->NPT	MTG in DGH ->YGN				MTG in DGH ->YGN					SVY in YGN YGN->	MTG in DGH ->YGN		
25	16 Mar	Wed	->NPT MTG w/ MoHS	MTG w/ MoHS	->NPT MTG w/ MoHS				->NPT MTG w/ MoHS					->TKO	->NPT MTG w/ MoHS		
26	17 Mar	Thu	Team MTG						Team MTG						Team MTG		
27	18 Mar	Fri	->YGN MTG w/ JICA, SVY in Similar hospitals YGN->						->YGN						->YGN MTG w/ JICA, SVY in Similar hospitals YGN->		
28	19 Mar	Sat	->TKO												->TKO		

Field Survey 2-2: 31st of March - 4th of April, 2017

			JICA Official	Project Manager / Architectural Planning	Architectural Design 1-a / Natural Condition Surveys	Structural Design 2
				Mr. Hiroaki MOCHIZUKI	Mr. Kohei NISHIKAWA	Mr. Win Min Oo
1	31 Mar	Fri		TKO->YGN		
2	1 Apr	Sat	->DWI SVY & MTG (TICA & JICA) in DGH			
3	2 Apr	Sun	SVY & MTG (MoHS, TICA & JICA) in DGH ->YGN			
4	3 Apr	Mon		SVY in YGN '->TKO		SVY in YGN
5	4 Apr	Tue		TKO		

Field Survey 2-3: 11st of June - 15th of June, 2018

			Structural Design 2	Health and Medical Care Planning
			Mr. Win Min Oo	Ms. Akiko OKITSU
1	11 Jun	Sun		TKO->YGN
2	12 Jun	Mon	->DWI SVY & MTG in DGH	
3	13 Jun	Tue	SVY & MTG in DGH	
4	14 Jun	Wed	SVY & MTG in DGH ->YGN	
5	15 Jun	Thu		TKO

Explanation of Draft Final Report for Dawei General Hospital:

15th of July - 22nd of July, 2017

			JICA Officials	Project Manager / Architectural Planning	Deputy Project Manager / Architectural Planning	Equipment Planning / Operation & Management Planning	Structural Design 2
				Mr. Hiroaki MOCHIZUKI	Mr. Shingo KURODA	Ms. Yasuko ASANUMA	Mr. Win Min Oo
1	15 Jul	Sat	TKO->YGN Team MTG				
2	16 Jul	Sun	-> DGH Team MTG				
3	17 Jul	Mon	MTG in DGH				
4	18 Jul	Tue	MTG in DGH ->YGN				
5	19 Jul	Wed	->NPT Team MTG				
6	20 Jul	Thu	MTG w/ MoHS ->YGN				
7	21 Jul	Fri	YGN -> MTG w/ JICA Office & EOJ ->TKO				
8	22 Jul	Sat	->TKO			->TKO	

TKO: Tkyo
YGN: Yangon
NPT: Nay Pyi Taw
MWY: Magway
DWI: Dawei
BGN: Bagan
BKK: Bangkok
EOJ: Embassy of Japan
MoHS: Ministry of Health and Sports
RHD: Regional Health Department
SVY: Survey
MTG: Meeting
IVY: Interview
PLN: Planning
DOC: Documentation

3. List of Parties Concerned in the Recipient Country

List of Paties Concerned in the Recipient Country

Organization		Name	position
Ministry of Health and Sports	Department of Medical Services	Dr.Myint Han	Director General
		Dr.Thida Kyu	Deputy Director General
		Dr.Aung Win	Deputy Director General
		Dr.Hlay Surp	Deputy Director General
		Dr. Moe Khaing	Director
		Dr.Than Naing Htut	Assistant Director
		Dr. Phet Mon Than	Medical officer
Dawei General Hospital		Dr. Myo Thant	Medical Superintendent (2017～)
		Dr. Myint Myint Khine	Medical Superintendent (2012～2016)
		Dr. San San Thi	Deputy Medical Superintendent
		Dr. Su Su Khine	Assistant Medical Superintendent
	Internal Medicine	Dr. Khin Soe New	Junior Consultant
	Surgical	Dr. Zaw Myint	Senior Consultant
		Dr. Aung Myat Min	Junior Consultant
	Orthopedics	Dr. Myo Si Thu	Junior Consultant
	Pediatrics	Dr. Hniu Hniu Lui	Senior Consultant
	Ophthalmology	Dr. Min Than Naing Oo	Senior Consultant
	ENT	Dr. Moe Moe San	Junior Consultant
	Dental	Dr. Pyone Cho	Senior Consultant
	Dermatology	Dr. Zaw Min	Assistant
	Psychiatry	Dr. Nang Yu Yu Win	Junior Consultant
	Obstetrics and Gynecology	Dr. Tin Aung	Senior Consultant
	Pathology	Dr. San San Win	Junior Consultant
	Radiology	Dr. Khin Win Phyu	Senior Consultant
	Rehabilitation	Daw Thandar Aung	Officer
Thailand International Cooperation Agency	Thai Cooperation Branch 1	Ms. Sayan Kongkoey	Senior Development Cooperation Officer
		Ms. Pin Sridurongkatum	Development Cooperation Officer Professional Level
Fire Service Department		U Khin Maung Yee	Deputy Director
Dawei Township Development Committee		U Aung Kyaw Myo	Assistant Director
Electric Supply Enterprise (Dawei)		U Kyi Swe Lin	Township Enginner
Department of Meteorology and Hydrology (Dawei)		U Soe Paing	Assistant Director

4. Minutes of Discussions

(1) Field Survey 1-1

MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY ON THE PROJECT FOR
IMPROVEMENT OF MAGWAY GENERAL HOSPITAL AND DAWEI GENERAL HOSPITAL
IN
THE REPUBLIC OF THE UNION OF MYANMAR

In response to a request from the Government of Republic of the Union of Myanmar (hereinafter referred to as "Myanmar"), the Government of Japan decided to conduct a Preparatory Survey on the Project for Improvement of Magway General Hospital and Dawei General Hospital (hereinafter referred to as "the Project ") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent the Preparatory Survey Team (hereinafter referred to as "the Team") to Myanmar, which is headed by Mr.Taro Kikuchi, Director of Health Division 4, Human Development Department, JICA, and is scheduled to stay in the country from January 10 to January 22.

The Team held discussions with the officials concerned of the Government of Republic of the Union of Myanmar and conducted a field survey.

As a result of discussions and field survey, both sides confirmed the main issues described in the attachment. The Team will proceed to further works and prepare the Preparatory Survey Report.

Nay Pyi Taw, January 21st 2016

Mr.Taro Kikuchi
Team leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Dr. Myint Han
Director General
Department of Medical Services
Ministry of Health
Republic of the Union of Myanmar

ATTACHMENT

1. Objective of the Project

The objective of the Project is to make better the quality of healthcare services and educational environment at Magway General Hospital (MgGH) and Dawei General Hospital (DGH) by developing facilities and providing equipment.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey on the Project for Improvement of Magway General Hospital and Dawei General Hospital".

3. Project sites

The project sites are located in MgGH and DGH. The proposed layouts of the construction at the sites are shown in the Master Plan (Annex 1)

4. Responsible and Implementing Agency

Department of Medical Services, Ministry of Health (MOH).

5. Items requested by the Government of the Union of Myanmar

5-1 The requested facilities and the requested equipment are described in Annex-2, but not limited to.

5-2 JICA will assess the appropriateness of the items for approval by the Cabinet of the Government of Japan.

6. Japan's Grant Aid

The Myanmar side understands the scheme of Japan`s Grant Aid and its procedures described in the Annex 3, 4 and 5 for smooth implementation of the Project as a condition for the Japanese Grant Aid to be implemented. Moreover, the Annex 6, articulating the undertakings to be taken by the Government of Republic of the Union of Myanmar, will be detailed as the Preparatory Survey progresses and shall be agreed at the time of the explanation of the draft Preparatory Survey Report, and then will finally be attached to the Grant Agreement.

7. Schedule of the Study

7-1. The consultants will continue the first field survey in Myanmar until February 6 2016, and conduct the second survey from February 21 to March 19, 2016.

7-2. JICA will prepare a draft Preparatory Survey Report in English and carry out the third survey in order to explain its contents around August 2016.

7-3. After the contents of the draft Preparatory Survey Report is accepted in principle and the undertakings described in the Annex 6 are fully agreed by the Myanmar side, JICA will produce the final version and send its copies to the Myanmar side around October 2016.

7-4. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Myanmar side confirmed to give due environmental and social considerations during the implementation of the Project and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010).

8-2. The Myanmar side shall confirm the necessary procedures concerning the environmental assessment based on the Guidelines of Initial Environmental Examination (IEE) and the Environmental Impact Assessment (EIA) under the Environmental Conservation Law. If the project is found applicable to the Guidelines, the Myanmar side shall take necessary measures to obtain environmental license before the tender and report it to JICA Myanmar office.

9. Necessity of Soft Component

Both sides confirmed the necessity of soft component on basic skills and proper use of the equipment. That will be provided under the Project. The team will examine the appropriateness and make the detailed plan by August 2016.

10. Other Relevant Issues

MOH will discuss with the concerned department on the Myanmar side over the guideline for Initial Environmental Examination (IEE) and the Environmental Impact Assessment (EIA) under the Myanmar Environmental Conservation Law.

Japanese side requested the Myanmar side to ensure recruitment and distribution of the sufficient staff in order to provide quality medical services at the both hospitals.

At the level of the MgGH, Japanese side encouraged the Myanmar side to consider facilitating the collaboration with other JICA cooperative operations in the area of medical education.

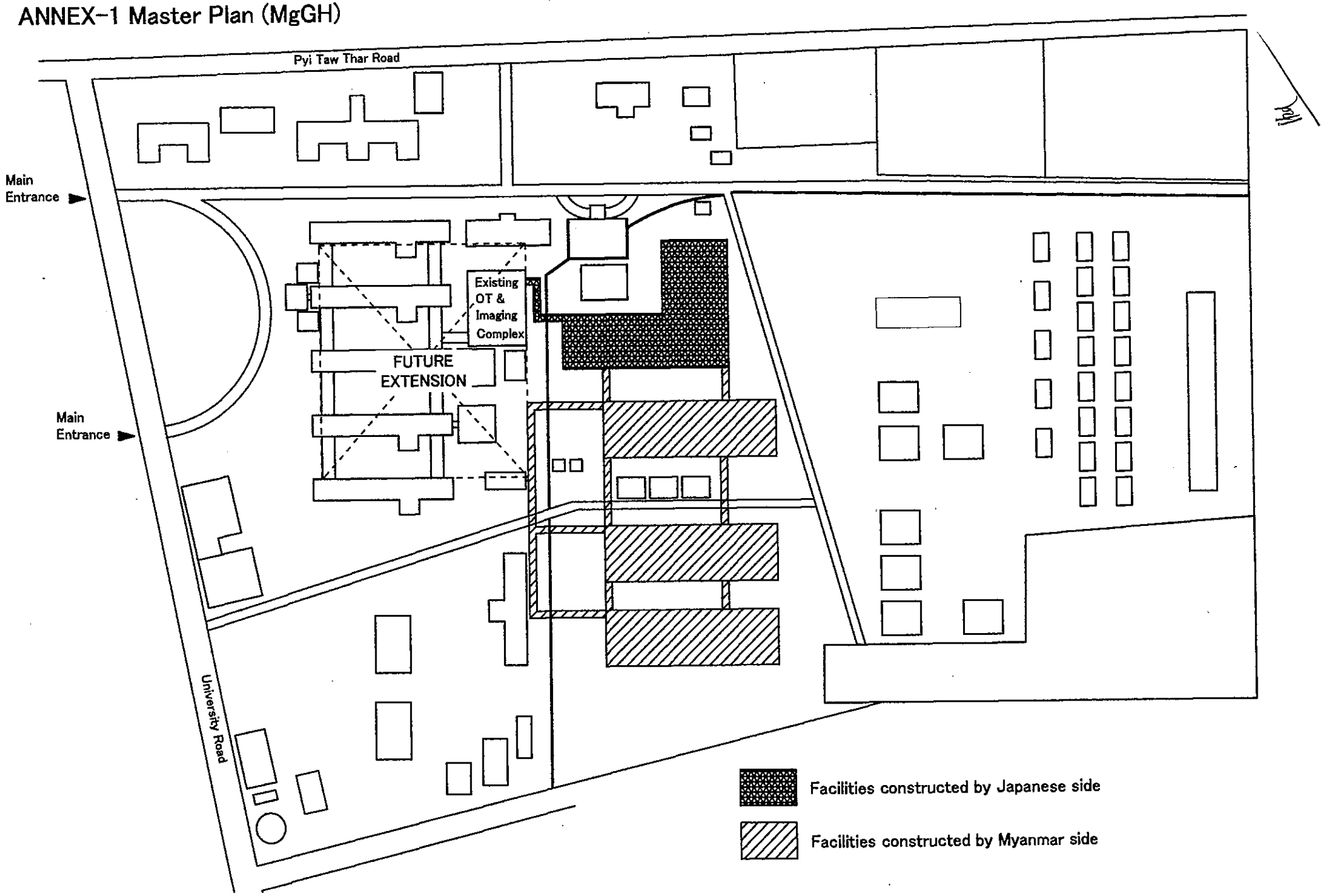
Japanese side requested the Myanmar side to provide the result of on-going discussion with the international agency that will develop emergency department in DGH.

The deputy minister from the MOH, Myanmar met with the Team during his visit to Dawei and discussed about the Project in DGH. Deputy Minister emphasized that the proposed hospital building in the Project should be at least 3 or 4 storied one, if it is possible since DGH will be upgraded to 500 bedded hospital in the near future. He insisted that the priority of the Project should be the hospital building because the necessary medical equipment will be possibly contributed by the Myanmar side. The Project should be designed in the manner how the concept described in the Annex 2 is realized.

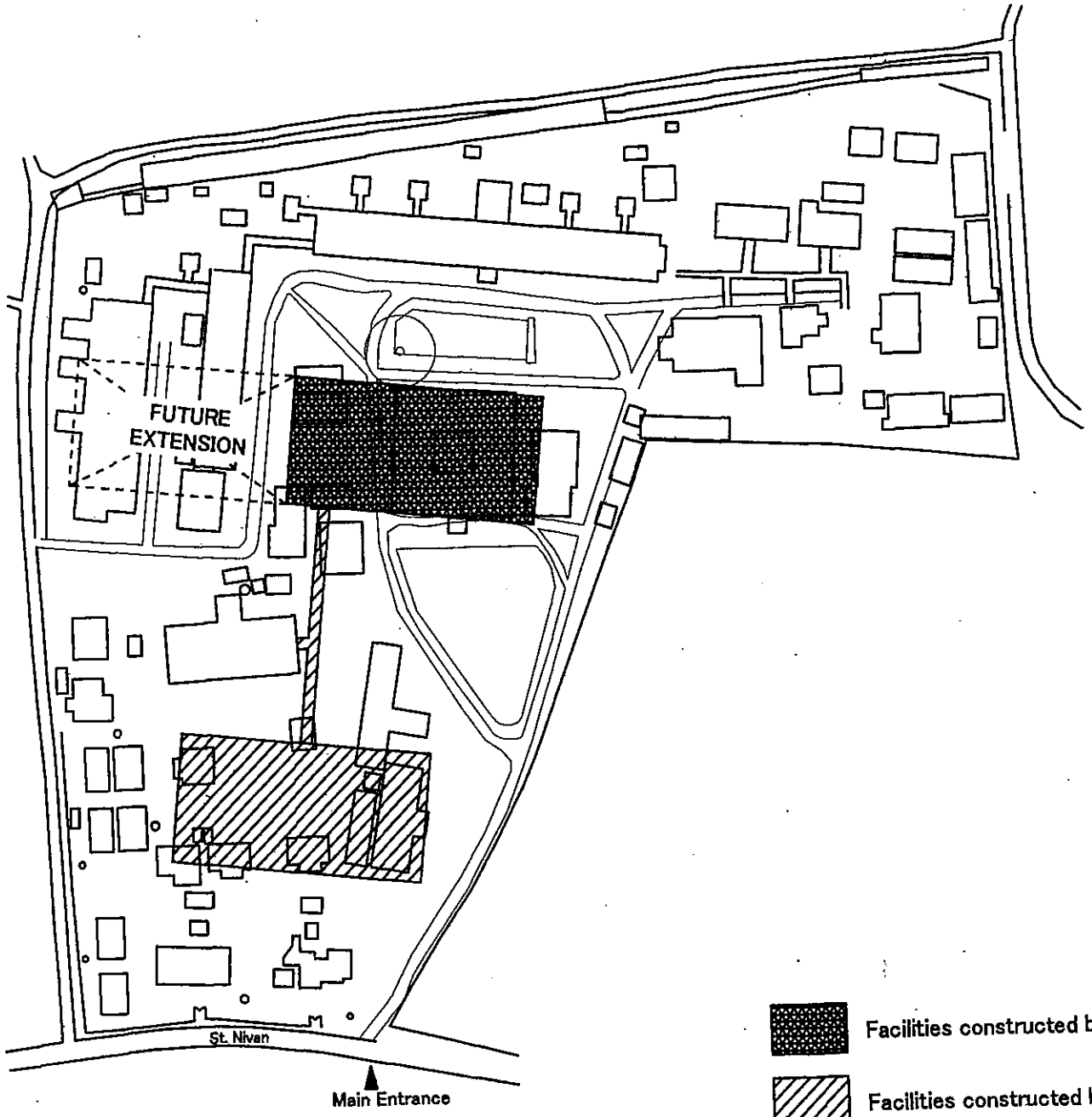
END

Annex 1 Master Plan (MgGH, DGH)
Annex 2 Project Concept
Annex 3 Japan's Grant Aid
Annex 4 Flow Chart of Japanese Grant Aid Procedures
Annex 5 Financial Flow of Japanese Grant Aid
Annex 6 Major Undertakings to be taken by the Government of Republic of the Union of Myanmar

ANNEX-1 Master Plan (MgGH)



ANNEX-1 Master Plan (DGH)



Facilities constructed by Japanese side

Facilities constructed by Myanmar side

Annex 2 (As of January 21st, 2016)

Concept of the Project for Improvement of Regional General Hospitals (Magway and Dawei)

- Universal design of facilities with international standards for delivering patient-centered healthcare services
- Effective utilization of existing facilities and harmonization with the new facilities installed under the Master Plan
- Favorable educational environment provided to human resource for health such as hospital staff and medical students
- Disaster reduction

1. Facilities

- Magway General Hospital
  - Obstetrics and Gynecology
  - Neonatal Unit
  - Operation Theater
  - Intensive Care Unit
  - Central Sterile and Supply Department
  - Emergency Room

- Dawei General Hospital
  - Out Patient Department
  - Diagnostic Imaging Department (e.g. place for MRI)
  - Emergency Room
  - Operation Theater
  - Central Sterile and Supply Department
  - Intensive Care Unit
  - Laboratory Department including Blood Bank

2. Equipment

Essential equipment for better functioning of the above-mentioned facilities.

END

Annex 3: Japan's Grant Aid

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures:

- Preparatory Survey
  - ➢ The Survey conducted by JICA
- Appraisal &Approval
  - ➢ Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
  - ➢ The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
  - ➢ Agreement concluded between JICA and a recipient country
- Implementation
  - ➢ Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is

confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex 6.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

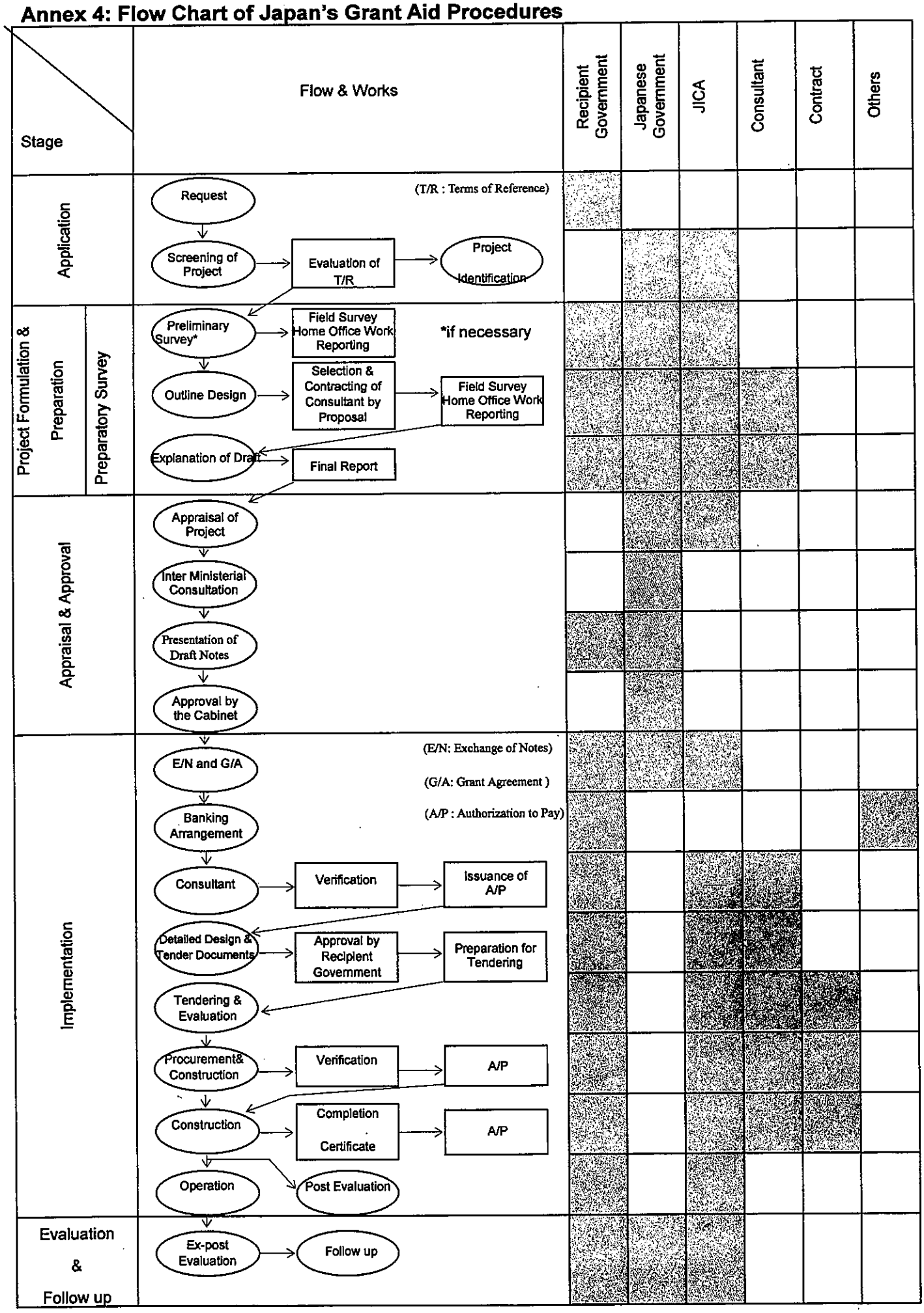
(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

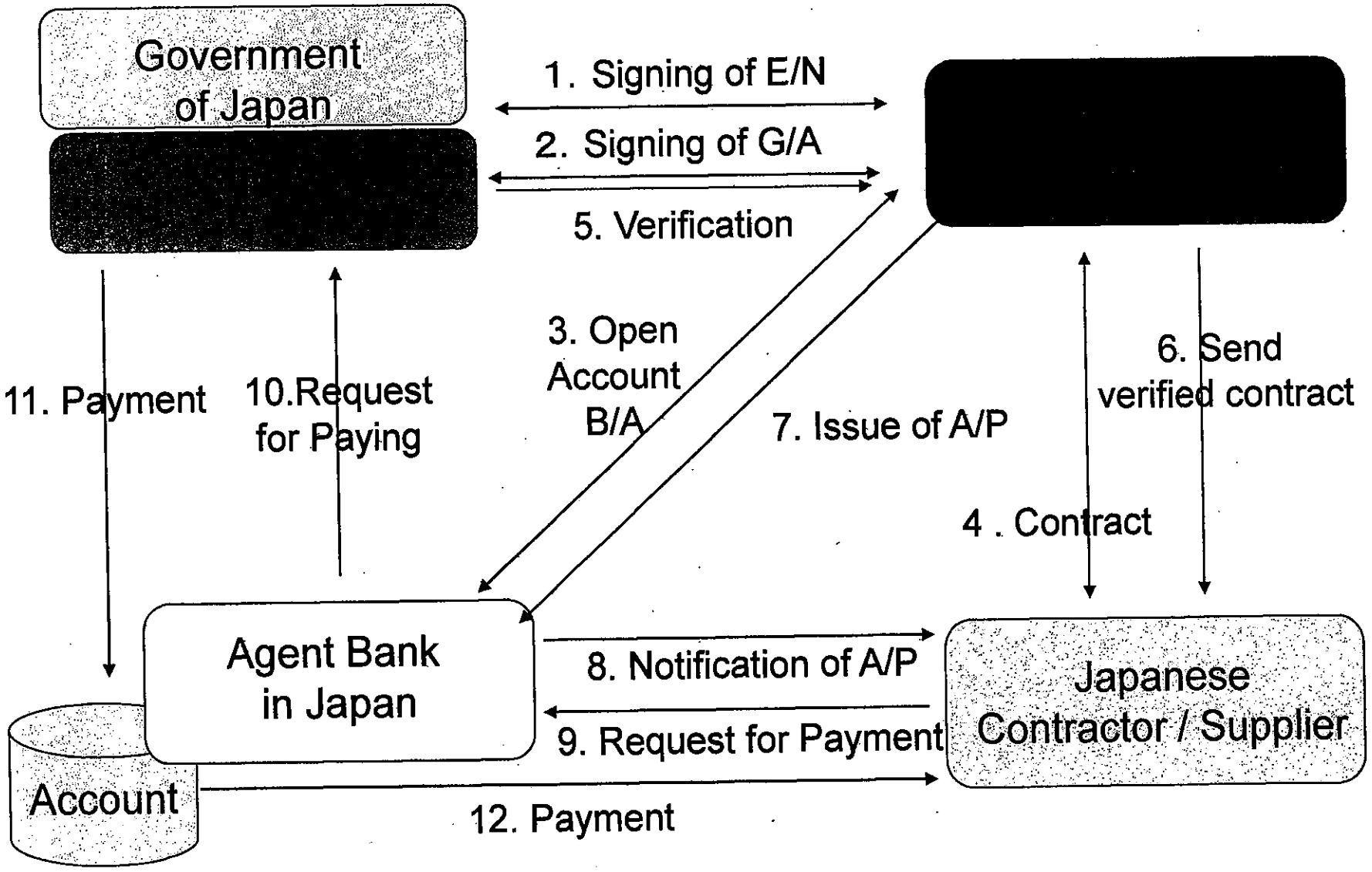
A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

Annex 4: Flow Chart of Japan's Grant Aid Procedures



Annex 5

Financial Flow of Japan's Grant Aid



Annex 6: Major Undertakings to be taken by the Government of Republic of the Union of Myanmar and covered under Japan's Grant Aid (Draft)

Major Undertakings to be taken by Government of Republic of the Union of Myanmar

1. Before the Tender

NO	Items	Deadline	In charge	Cost	Ref.
1	To open Bank Account (Banking Arrangement (B/A))	within 1 month after G/A			
2	To take necessary measures to obtain environmental license, if confirmed necessary, and report it to JICA Myanmar office.	before notice of the tender document			
3	To secure the Project site including building area and temporary construction yard and stock yard within the Project area	before notice of the tender document			
4	To obtain the planning and/or building permit	before notice of the tender document			
5	To clear, level and reclaimu the Project site including removal of the existing buildings, the existing pavement, underground obstacles and trees if necessary	before notice of the tender document			

2. During the Project Implementation

NO	Items	Deadline	In charge	Cost	Ref.
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the singing of the contract			
	2) Payment commission for A/P	every payment			
2	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country				
	1) Tax exemption and customs clearance of the products at the port of disembarkation	during the Project			
3	To accord Japanese nationals and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work	during the Project			
4	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services be exempted; Such customs duties, internal taxes and other fiscal levies mentioned above include VAT, commercial tax, income tax and corporate tax of Japanese nationals, resident tax, fuel tax, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract	during the Project			
5	To bear all the expenses, other than those to be borne by the Grant Aid	during the Project			
6	To construct the following facility				
	1) The fences in and around the site	before the completion of the construction			
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities				
	1) Electricity The distributing power line to the site.	6 months before completion of the construction			
	2) Water Supply The city water distribution main to the site, if available	6 months before completion of the construction			
	3) Drainage The city drainage main (for storm water, sewer and others) to the site, if available	6 months before completion of the construction			

	4) Telecommunications Telephone line and Internet line to the MDF and server room in new building, if necessary.	6 months before completion of the construction			
8	To submit environmental monitoring report to JICA Myanmar Office, if applicable	during the Project			

3. After the Project

NO	Items	Deadline	In charge	Cost	Ref.
1	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid by: 1) Allocation of sufficient budget for operation and maintenance 2) Training of staff on the specialized medical services 3) Contracting with agents for maintenance of specialized medical equipment and lift 4) Regular collection and proper disposals of medical waste and waste water	after completion of the construction			
2	To appoint and retain sufficient staff with appropriate skills and experiences for operation and maintenance of new facilities and equipment provided under the Grant Aid	after completion of the construction			
3	To provide general furniture and equipment, other than those to be borne by the Grant Aid, if necessary	after completion of the construction			

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

Major Undertakings to be covered under the Japan's Grant Aid

No	Items	Deadline	Cost Estimated (Million Japanese Yen)*	
1	To construct hospital and to procure equipment			
	1) To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country			
	a) Marine(Air) transportation of the products from Japan to the recipient country			
	b) Internal transportation from the port of disembarkation to the project site			
	2) To construct access roads			
	a) Within the site			
	3) To construct the temporary building			
	4) To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities			
	a) Electricity			
	- The drop wiring and internal wiring within the site			
	- The main circuit breaker and transformer			
	b) Water Supply			
	- The supply system within the site (receiving and/or elevated tanks)			
	c) Drainage			
	- The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site			
	d) Furniture and Equipment			
	- Project equipment			
2	To implement detailed design, tender support and construction supervision (Consultant)			
	Total			

*; The cost estimates are provisional. This is subject to the approval of the Government of Japan.

(2) Explanation of Draft Final Report

Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Magway General Hospital and Dawei General Hospital
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed between the Government of Republic of the Union of Myanmar (hereinafter referred to as " Myanmar") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on both 21st January, 2016 and 1st September, 2016, as well as in response to the request from the Myanmar dated 19th October 2016, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report on the Project for the Improvement of Magway General Hospital and Dawei General Hospital (hereinafter referred to as "the Draft Report"), headed by Mr. Taro KIKUCHI, Director, Health Team 4, Health Group 2, Human Development Department, JICA from 15th July to 21st July 2017.

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Nay Pyi Taw, 20th July 2017

Mr. Taro Kikuchi
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Prof. Myint Han
Director General
Department of Medical Services
Ministry of Health and Sports
The Republic of the Union of Myanmar

ATTACHMENT

1. Title of the Project

   The team explained the project title shall be registered respectively because the implementation schedules at the two locations of Magway General Hospital and Dawei General Hospital (hereinafter referred to as "DGH") were found definitely separate as mentioned in the Minutes of Discussions dated on 1st September, 2016. Both sides reconfirmed that the project for DGH was officially named as "the Project for the Improvement of Dawei General Hospital" (hereinafter referred to as "the Project").

2. Objective of the Project

   The objective of the Project is to make better the quality of medical and health care services and the environment for professional development at DGH by constructing a building and providing equipment thereby contributing to enhancement of the quality of people's life in Myanmar.

3. Contents of the Project

   Both sides reconfirmed that the site of the Project in DGH is shown in Annex 1. As for the medical equipment provided by the Japan side included in Annex 2.

4. Responsible Authority for the Project

   Both sides reconfirmed the authority responsible for the Project(hereinafter referred to as "the Executing Agency") is the Department of Medical Services, Ministry of Health and Sports (hereinafter referred to as "MoHS"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be taken care by relevant authorities properly and on time. The organization chart is shown in Annex 3.

5. Contents of the Draft Report

   After the explanation of the contents of the Draft Report by the Team, the Myanmar side agreed to its contents.

6. Cost Estimate

Both sides confirmed that the cost estimate including the contingency described in the Draft Report is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

7. Confidentiality of the Cost Estimate and Technical Specifications

Both sides confirmed that the cost estimate and technical specifications in the Draft Report should never be duplicated or disclosed to any third parties until all the contracts under the Project are concluded.

8. Timeline for the Project Implementation

The Team explained to the Myanmar side that the expected timeline for the project implementation is attached as Annex 4.

9. Expected Outcomes and Indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Myanmar side will be responsible for the achievement of those key indicators targeted in year 2024 and shall monitor the progress based on those indicators.

[Quantitative indicators]

Quantitative Effect (Operation and Effect indicators)		
Indicators	Original (Yr 2016)	Target (Yr 2024)
The annual number of examinations with CT procured by the Japan side	- (993 by existing CT)	1,590
The annual number of MRI examinations	-	373
The annual number of surgical operations	4,354	5,878

[Qualitative indicators]

1. Emergency patients get effectively treated through improved patient and staff flow including swift patient transfer to the new CT room and operation theatre complex.
2. Operations in the clean environment are performed with the operation theatre complex newly developed.
3. Diagnostic capacity at DGH is enhanced through the improvement of medical and health care services.

4. Clinical practice environment is improved at DGH through equipment provision and building construction.

10. Technical Assistance ("Soft Component" of the Project)

Considering the sustainable operation and maintenance of the products and services granted through the Project, technical assistance is planned under the Project. The Myanmar side confirmed to deploy necessary number of counterparts who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

11. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 5. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in 2-4 of Annex 5, both sides confirmed that such levies in Mynamar which include income tax, withholding tax, commercial tax, custom duties and other levies imposed on imported goods which shall be clarified in the bid documents by MoHS during the implementation stage of the Project. The Myanmar side confirmed that necessary procedure for tax exemption above mentioned would be taken promptly to avoid delay in implementing the Project. In particular, both sides agreed the Myanmar side bears the commercial tax if it is not exempted.

The Myanmar side assured to take the necessary measures and coordination including allocation of the necessary budget which is preconditions of implementation of the Project. The amount to be budgeted over the next five (5) fiscal years on the Myanmar side is estimated in Annex 6 together with the budget preparation and approval process. Based on the estimation, the Team specifically requested the Myanmar side to prepare the additional FY2017 budget hopefully in this September. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both sides also confirmed that the Annex 5 will be used as an attachment of the Grant Agreement(G/A).

12. Monitoring during the Implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (hereinafter referred to as "PMR") attached as Annex 7. The timing of submission of PMR is described in Annex 5.

13. Project Completion

Both sides confirmed that the project completes when the building constructed and equipment procured by the grant are in operation. The completion of the Project will be reported to JICA promptly, but in any event not later than six months after completion of the Project.

14. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, and Sustainability). The result of the evaluation will be publicized. The Myanmar side is required to provide necessary support for the data collection.

15. Schedule of the Study

JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Myanmar side around December 2017.

16. Environmental and Social Considerations

16-1. General Issues

The Team explained that "JICA Guidelines for Environmental and Social Considerations (April 2010)" (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as C because the Project is likely to have minimal adverse impact on the environment under the Guidelines.

16-2. Environmental Conservation Law

The Myanmar side reconfirmed, as it happend in the case of the project for Magway General Hospital, that the Project would be subjected to the recommendation to be made by the Environmental Conservation Department, Ministry of Natural Resource and Environmental Conservation on the Initial Environmental Examination and/or the Environmental Impact Assessment, if applicable in compliance with the Environmental Conservation Law of Myanmar.

17. Other Relevant Issues

17-1. Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to

the public after all the contracts under the Project are concluded.

17-2. Maintenance of the Building and the Equipment

Both sides agreed on the importance of the maintenance, including preventive maintenance, of the JICA building and the equipment to avoid interruption of the medical and health care services and to reduce the cost for repair. Especially, considering that the building will be equipped with the two (2) lifts on the purpose to swiftly and safely carry patients to the Operation Theatre Complex and Intensive Care Unit, the Team requested the Myanmar side to secure enough budget necessary for appropriate maintenance of the lifts in addition to the equipment.

As for CT scanner, the Team explained the necessity of three-year maintenance as follows;

- one-year warranty after hand over of the equipment.
- two-year contract of maintenance services including replacement of recommendable spare parts, periodic checkup and other on-call maintenance services.

17-3. Transfer of Medical Equipment and Medical Furniture

The Team raised the necessity to transfer the existing medical equipment and medical furniture, included in Annex 2, to the JICA building so that the building is made functional. The Team also proposed the Myanmar side to take note of the transfer schedule as per Annex 8 also in order to avoid interruption of the medical and health care services. The Myanmar side agreed to take full responsibility for the transfer.

17-4. Initiative in coordinating the Construction Works

Responding to the request from the Team, the Myanmar side agreed to take initiative in coordinating the construction works at DGH to be conducted one after another by MoHS, Thai International Cooperation Agency and JICA. The tentative construction schedule of the three agencies is presented by the Team in Annex 9. The Myanmar side agreed to take necessary procedures for smooth progress of each construction in a coordinated manner.

17-5. Both sides confirmed the two corridors between MoHS 50 beds new ward building and the JICA building as well as MoHS 266 beds new ward building and the JICA building are essential to achieve the objective of the Project. The Myanmar side agreed to undertake the responsibility for constructing the two corridors.

17-6. Human Resources

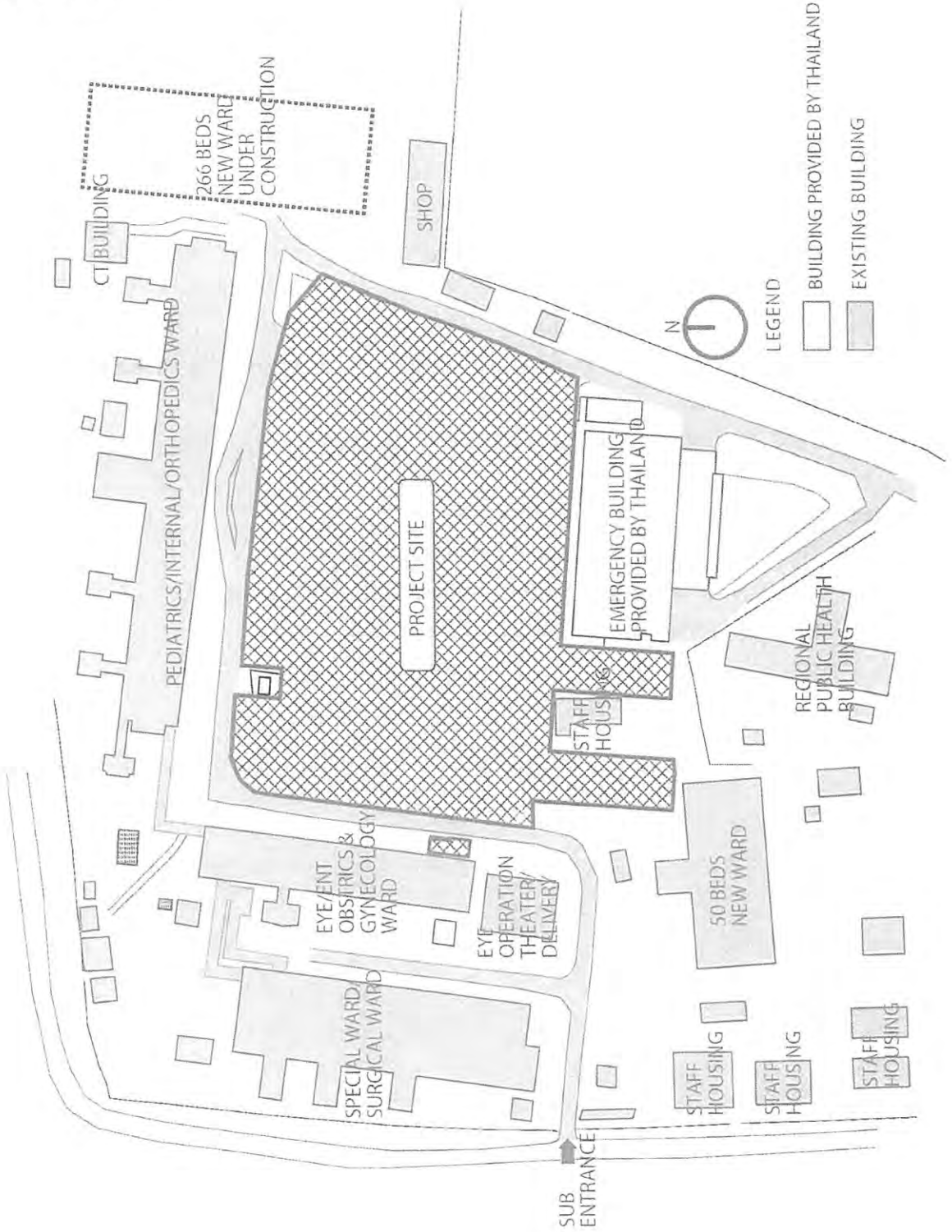
The Team provided the estimated number of necessary staff for the project

implementation, as described in Annex 10. The Myanmar side agreed to provide staff at the commencement of installation work of the equipment. The team requested, based on the information that DGH would be officially appointed for the "Stroke Care Centre", Myanmar side to assure DGH enough capable for the centre.

Annex 1 Project Site
Annex 2 Medical Equipment and Medical Furniture List
Annex 3 Organization Chart
Annex 4 Project Implementation Schedule
Annex 5 Major Undertakings to be taken by Recipient Government/to be covered by the Japanese Grant
Annex 6 Total Estimated Costs to be included in the Budget Proposal for Parliaments' Approval
Annex 7 Project Monitoring Report (template)
Annex 8 Medical Equipment and Furniture Transfer Schedule
Annex 9 Tentative Construction Schedules of the MoHS, TICA and JICA
Annex 10 Necessary Staff for the Project Implementation

ANNEX 1

Project Site



ANNEX 2

Medical Equipment and Medical Furniture List

Department	Item No.	Description	Q'ty	Priority
Outpatient	OP-1	Dental unit	2	A
Outpatient	OP-2	ENT unit	1	A
Outpatient	OP-3	Film viewer (for 1 film)	10	A
Outpatient	OP-4	Consultation desk and chair	15	●
Outpatient	OP-5	Examination bed	13	●
Outpatient	OP-6	Ob/Gy examination table	2	●
Outpatient	OP-7	Diagnostic set	10	●
Outpatient	OP-8	Weighing and height scale for adult	2	●
Outpatient	OP-9	Weighing and height scale for infant	2	●
Outpatient	OP-10	Pharmaceutical refrigerator	1	●
Outpatient	OP-11	Examination set for ophthalmology	1	●
Outpatient	OP-12	Examination set for ENT	1	●
Outpatient	OP-13	Ultrasound scanner	2	●
Outpatient(Phisology Laboratory)	PL-1	Spirometer	1	●
Outpatient(Phisology Laboratory)	PL-2	Audiometer	1	●
Outpatient(Phisology Laboratory)	PL-3	ECG	1	●
Outpatient(Phisology Laboratory)	PL-4	Stress ECG	1	●
Outpatient(Phisology Laboratory)	PL-5	Mammography unit	1	●
Outpatient(Pharmarcy)	PH-1	Medicine cabinet	6	●
Outpatient(Pharmarcy)	PH-2	Pharmaceutical refrigerator	3	●
Outpatient(Pharmarcy)	PH-3	Medicine cabient	7	●
Diagnostic Imaging	RD-1	CT scanner	1	A
Diagnostic Imaging	RD-2	General X-ray machine	1	A
Diagnostic Imaging	RD-3	Fluoroscopy X-ray machine	1	A
Diagnostic Imaging	RD-4	MRI unit	1	A
Operation Theatre Complex	OT-1	Operation lamp A (dual lamp type, for major surgery)	4	A
Operation Theatre Complex	OT-2	Operation lamp B (single lamp type, for minor surgery)	2	A
Operation Theatre Complex	OT-3	Hand scrub station	3	A
Operation Theatre Complex	OT-4	Warm cabinet	1	A
Operation Theatre Complex	OT-5	Film viewer (for 2 films)	4	A
Operation Theatre Complex	OT-6	Caesarean instrument Set	4	●
Operation Theatre Complex	OT-7	Major surgery instrument set	2	●
Operation Theatre Complex	OT-8	Oxygen flowmeter and humidifier	6	●
Operation Theatre Complex	OT-9	Operating Table	6	●
Operation Theatre Complex	OT-10	Patient monitor	6	●
Operation Theatre Complex	OT-11	Electrosurgical unit	6	●
Operation Theatre Complex	OT-12	Infusion pump	10	●
Operation Theatre Complex	OT-13	Syringe pump	10	●
Operation Theatre Complex	OT-14	Suction unit	6	●
Operation Theatre Complex	OT-15	Oxygen Concentrator	3	●
Operation Theatre Complex	OT-16	Mayo's Tray with stand	6	●
Operation Theatre Complex	OT-17	Kidney Tray	6	●
Operation Theatre Complex	OT-18	Laryngoscope set for adult and pediatric	6	●
Operation Theatre Complex	OT-19	Instrument trolley	6	●
Operation Theatre Complex	OT-20	Instrument cabinet	6	●
Operation Theatre Complex	OT-21	Infusion stand	6	●
Operation Theatre Complex	OT-22	Defibrillator	5	●
Operation Theatre Complex	OT-23	Patient trolley	2	●
Operation Theatre Complex	OT-24	Ambu resuscitator	6	●
Operation Theatre Complex	OT-25	Adjustable stool for surgeon	6	●
Operation Theatre Complex	OT-25	Anesthetic machine with ventilator	6	●
Operation Theatre Complex	OT-26	Recovery bed	4	●
Central Sterile Supply Department(CSSD)	SU-1	High pressure steam sterilizer L	1	A
Central Sterile Supply Department(CSSD)	SU-2	High pressure steam sterilizer M	1	A
Central Sterile Supply Department(CSSD)	SU-3	Dressing drum	2	●
Central Sterile Supply Department(CSSD)	SU-4	Linen cart	4	●
Central Sterile Supply Department(CSSD)	SU-5	Store rack for dressing drum	3	●
Central Sterile Supply Department(CSSD)	SU-6	Large table and chairs	3	●
Central Sterile Supply Department(CSSD)	SU-7	Sterile store cabinet	9	●
Intensive Care Unit(ICU)	ICU-1	ICU bed	6	●
Intensive Care Unit(ICU)	ICU-2	Oxygen concentrator	2	●
Intensive Care Unit(ICU)	ICU-3	Defibrillator	1	●
Intensive Care Unit(ICU)	ICU-4	Patient monitor	6	●
Intensive Care Unit(ICU)	ICU-5	Infusion pump	6	●
Intensive Care Unit(ICU)	ICU-6	Syringe pump	4	●
Intensive Care Unit(ICU)	ICU-7	Infusion stand	6	●
Intensive Care Unit(ICU)	ICU-8	Ventilator	4	●

Medical Equipment and Medical Furniture List

Department	Item No.	Description	Q'ty	Priority
Intensive Care Unit(ICU)	ICU-9	Oxygen flowmeter and humidifier	6	●
Intensive Care Unit(ICU)	ICU-10	Pulse oximeter	3	●
Intensive Care Unit(ICU)	ICU-11	Ultrasound scanner, portable	1	●
Intensive Care Unit(ICU)	ICU-12	Mobile X-ray unit	1	●
Intensive Care Unit(ICU)	ICU-13	Emergency cart	2	●
Intensive Care Unit(ICU)	ICU-14	Suction machine	6	●
Intensive Care Unit(ICU)	ICU-15	Central monitor	1	●
Intensive Care Unit(ICU)	ICU-16	LCD monitor	1	●
Intensive Care Unit(ICU)	ICU-17	Recorder	1	●
Intensive Care Unit(ICU)	ICU-18	Receiver	1	●
Intensive Care Unit(ICU)	ICU-19	Laser printer	1	●
Endoscopy Unit	EN-1	Bronchoscope	1	●
Endoscopy Unit	EN-2	Gastrointestinal fiberscope	1	●
Endoscopy Unit	EN-3	Colonoscopy	1	●
Endoscopy Unit	EN-4	Duodenoscopy with electrosurgial unit	1	●
Endoscopy Unit	EN-5	Endoscope rack	2	●
Endoscopy Unit	EN-6	Endoscopic table	2	●
Endoscopy Unit	EN-7	Recovery bed	2	●
Endoscopy Unit	EN-8	Examination bed	1	●
Laboratory	Biochemistry	Automated biochemistry analyzer	1	Transfer
Laboratory	Biochemistry	Semi-automatic biochemistry analyzer	1	Transfer
Laboratory	Biochemistry	Spectrophotometer	1	Transfer
Laboratory	Biochemistry	Water distiller	1	Transfer
Laboratory	Hematology	Blood cell counter	1	Transfer
Laboratory	Hematology	Centrifuge	3	Transfer
Laboratory	Hematology	Coagulation analyzer	1	Transfer
Laboratory	Hematology	Blood gas analyzer	1	Transfer
Laboratory	Hematology	Microscope	1	Transfer
Laboratory	Hematology	ELISA machine	1	Transfer
Laboratory	Hematology	Thawing water bath	1	Transfer
Laboratory	Hematology	Electrolyte analyzer	1	Transfer
Laboratory	Hematology	CD4 analyzer	1	Transfer
Laboratory	Hematology	Hematocrit centrifuge	1	Transfer
Laboratory	Hematology	Spectrophotometer	1	Transfer
Laboratory	Histopathology	Automatic sliding strainer	1	Transfer
Laboratory	Histopathology	Tissue processor	1	Transfer
Laboratory	Histopathology	Paraffin bath	1	Transfer
Laboratory	Histopathology	Microtome	1	Transfer
Laboratory	Histopathology	Genetic analyzer	1	Transfer
Laboratory	Histopathology	Computer for genetic analyzer	1	Transfer
Laboratory	Histopathology	Printer for genetic analyzer	1	Transfer
Laboratory	Histopathology	Hot air oven	1	Transfer
Laboratory	Histopathology	Refrigerator	1	Transfer
Laboratory	Histopathology	Thawing water bath	1	Transfer
Laboratory	Microbiology	Incubator	1	Transfer
Laboratory	Microbiology	Oven	1	Transfer
Laboratory	Microbiology	Safety cabinet	1	Transfer
Laboratory	Microbiology	Microscope	1	Transfer
Laboratory	Microbiology	Urine Analyzer	1	Transfer
Laboratory	Microbiology	High pressure steam sterilizer	1	Transfer
Laboratory	Microbiology	Centrifuge	1	Transfer
Laboratory	Microbiology	Refrigerator	1	Transfer
Laboratory	Blood bank	Blood bank refrigerator	3	Transfer
Laboratory	Blood bank	Deep freezer for blood component storage	2	Transfer
Laboratory	Blood bank	Micropipette set	1	Transfer
Laboratory	Blood bank	Microscope	1	Transfer
Laboratory	Blood bank	Refrigerated centrifuge	1	Transfer
Laboratory	Blood bank	Plasma centrifuge	1	Transfer
Laboratory	Blood bank	Centrifuge for serofuge	1	Transfer
Laboratory	Blood bank	Platelet incubator with agitator	1	Transfer
Laboratory	Blood bank	Apheresis machine (blood component extractor)	1	Transfer
Laboratory	Blood bank	Leukocyte reduction machine	1	Transfer
Laboratory	Blood donor area	Donor bed	2	Transfer
Laboratory	Blood donor area	Hemoglobin meter	1	Transfer
Laboratory	Blood donor area	Blood bag shaker	2	Transfer
Laboratory	Blood donor area	Consultation desk and chair	1	Transfer

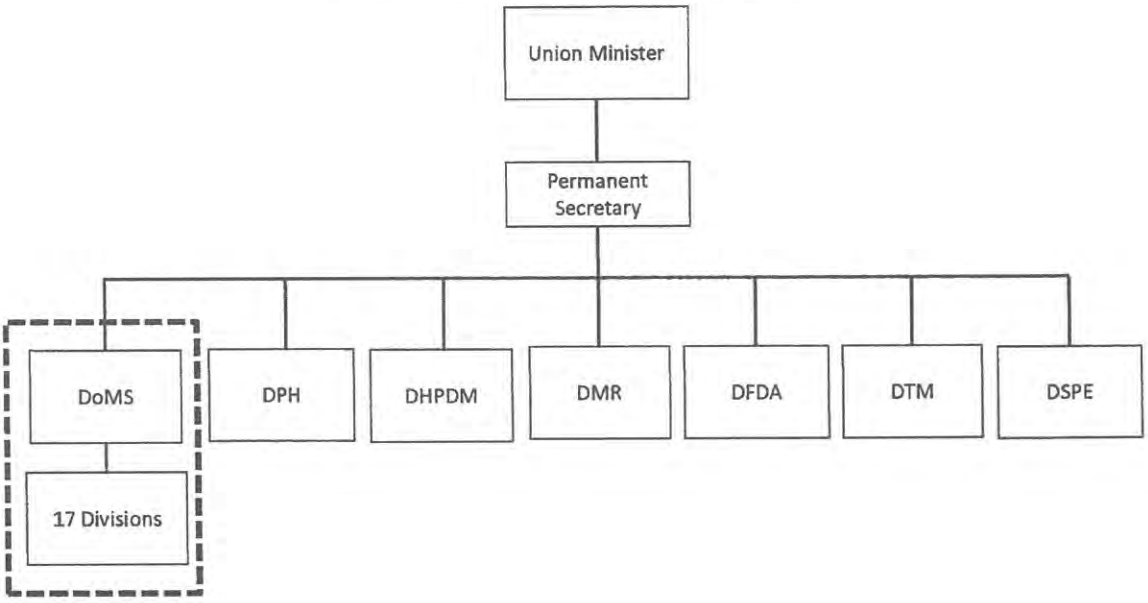
Medical Equipment and Medical Furniture List

Department	Item No.	Description	Q'ty	Priority
	A	Procured by the Japan side		
	●	Procured by the Myanmar Side		
	Transfer	Transferred by the Myanmar side to the JICA building.		

Organization Chart

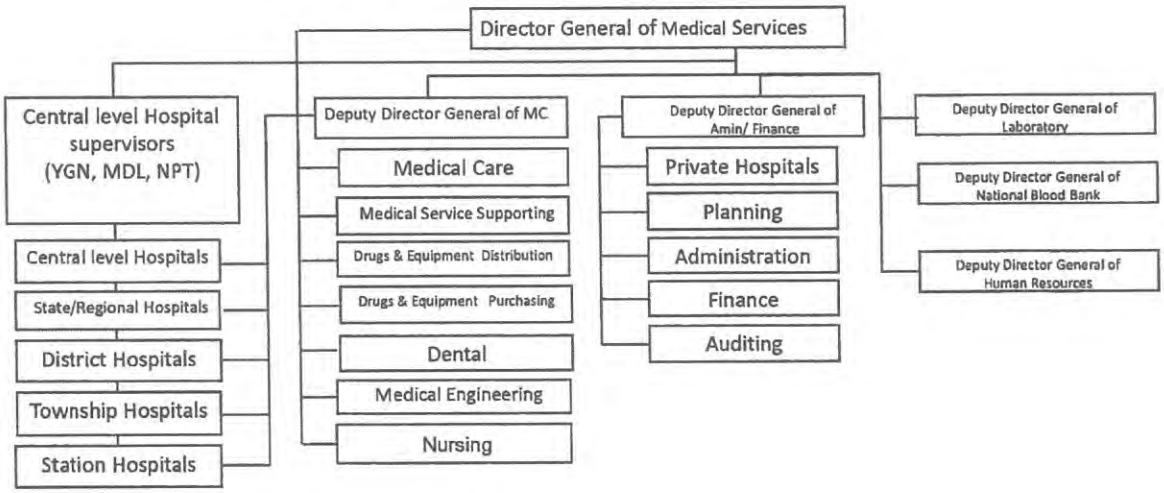
Ministry of Health and Sports

Organization Chart of Ministry of Health and Sports



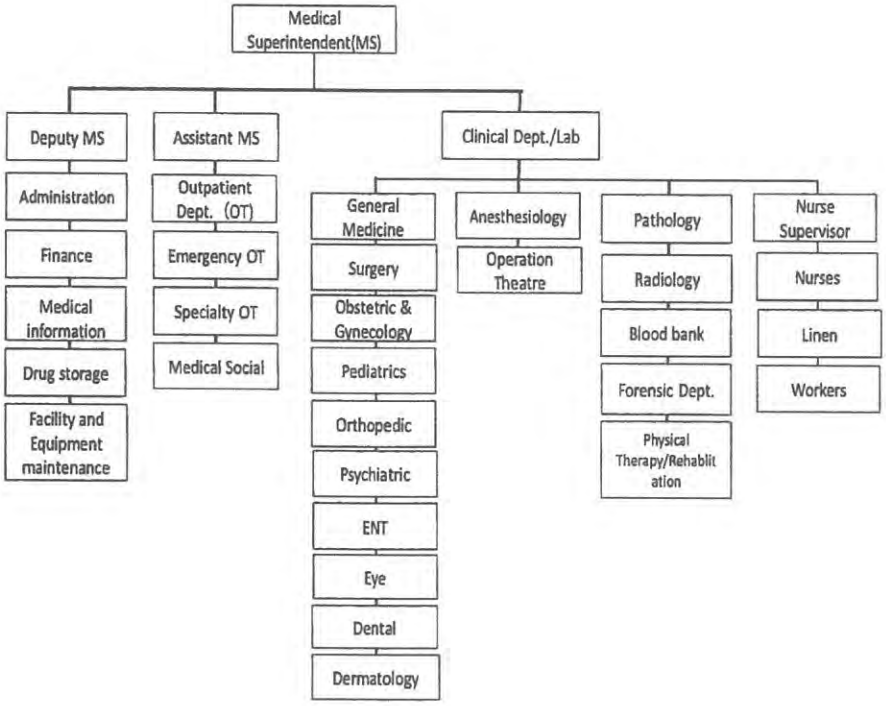
Department of Medical Services, MoHS

Organization Chart of Department of Medical Services, MOH&S



ANNEX 3

Dawei General Hospital



ANNEX-4 Project Implementation Schedule

Project Implementation Schedule

PROJECT PHASE	2017 Nov	Dec	2018 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2019 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2020 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2021 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2022 Jan	Feb
Appraisal & Approval																																																		
Cabinet Approval in Japan	○																																																
Exchange of Note (E/N) / Grant Agreement (G/A)		●●																																															
Detailed Design & Bidding				●																																													
Consultant Agreement																																																	
Detailed Design & Bidding Document																																																
Bidding Procedure																	P/Q	Bidding																																
Construction Contract																																																
Building Construction																																																
Equipment Provision																																																
Soft Component																																																

Works by Government of Myanmar	FY2017 14,591 thousnd MMK	FY2018 323,069 thousnd MMK	FY2019 11,849 thousnd MMK	FY2020 370,726 thousnd MMK	FY2021 3,299,976 thousnd MMK
1) Level the ground of the Project site including demolition of existing buildings and removal of trees					
2) Relocate existing wiring and piping system					
3) Obtain building permit					
4) Install high voltage lines and a service drop for the JICA building					
5) Obtain approval of IEE/EIA if applicable					
6) Procure and install general furniture					
7) Procure and install equipment and transfer existing equipment					
8) Planting and gardening works around the JICA building					
9) Construction of two connecting corridors					
10) Per diem, accommodation and transportation fee for Soft Component Program attendees					
11) Allocate necessary staff					
12) Commissions					
(Authorization to Pay)	▽		▽▽	▽▽▽	▽
(Consulting service)	▽		▽	▽	
(Construction)			▽	▽	
(Equipment)				▽	

Shipment
Installation & operation training
Defect notification period

※ schedule may be subject to change.

ANNEX 5

Major Undertakings to be taken by Recipient Government

1. Before the Bidding

NO	Items	Deadline	In charge	Cost	Ref.
1	To open Bank Account (Banking Arrangement (B/A))	within 1 month after G/A	MoPF		
2	To obtain approval of IEE/EIA if applicable	within 2 month after G/A	MoHS	13,690,000 MMK	
3	To secure the following lands 1) Project site for the JICA building (approx. 6,560m^2) in the Dawei General Hospital 2) temporary construction yard and stock yard near the Project site 3) borrow pit and disposal site near the Project site	1 month before notice of the bidding document	MoHS		
4	To clear and level the Project site by taking measures as follows 1) Relocation of the following function; - MS office and public health department office - Blood bank and laboratory 2) Demolition of the following buildings and structures; - One MS office building including public health department office - One Blood bank building and one laboratory building - Three motor cycle sheds - One rest space - One Medical gas storage - Two septic tanks 3) Diversion of power supply line 4) Removal of Trees	1 month before notice of the bidding document	MoHS	52,250,000 MMK	
5	To obtain building permit	1 month before notice of the bidding document	MoHS	270,819,000 MMK	
6	To submit Project Monitoring Report (with the result of detailed design)	before preparation of bidding document	MoHS		
7	To take necessary procedures for budgetary requests	See Annex 6	MoHS		

2. During the Project Implementation

NO	Items	Deadline	In charge	Cost	Ref.
1	To bear the following commissions to a bank in Japan for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the singing of the contract and the agreement	MoHS	179,000 MMK	
	2) Payment commission for A/P	every payment	MoPF	31,579,000 MMK	
2	To ensure prompt unloading and customs clearance at port of disembarkation in recipient country and to assist the supplier(s) with internal transportation therein		MoHS		
3	To accord Japanese nationals and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work	during the Project	MoHS		
4	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services be exempted	during the Project	MoHS MoPF		
5	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the implementation of the Project	during the Project	MoHS		
6	To submit Project Monitoring Report.	every month	MoHS		
7	To submit a report concerning completion of the Project	within six months after completion of the Project	MoHS		
8	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities				
	1) Electricity Install high voltage lines and a service drop for the JICA building	1 month before completion of the construction	MoHS	3,630,000 MMK	
	2) General furniture Procure and install general furniture	1 month after completion of the construction	MoHS	118,401,000 MMK	
	3) Medical equipment and medical furniture Procure and install equipment and transfer existing equipment	3 month after completion of the construction	MoHS	3,102,294,000 MMK	
	4) Planting and gardening Planting and gardening works around the JICA building	1 month after completion of the construction	MoHS	17,919,000 MMK	
	5) Connecting corridors Construction of two connecting corridors	3 month after completion of the construction	MoHS	752,625,000 MMK	
9	To ensure that proper personnel will be allocated for utilizing equipment effectively				
	1) Technical Assistance "Soft Component" Per diem, accommodation and transportation fee for Soft Component Program attendees	during implementation of the Soft Component	MoHS	7,803,000 MMK	
	2) Allocate sufficient staff with appropriate skills and experiences for operation and maintenance of the JICA building and equipment under the Grant Aid	at the commencement of installation work of the equipment	MoHS	16,885,000 MMK (2021)	

3. After the Project

NO	Items	Deadline	In charge	Cost	Ref.
1	To maintain and use properly and effectively the JICA building constructed and equipment under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	MoHS	621,697,000 MMK annually	

(A/P: Authorization to Pay, B/A: Banking Arrangement, EIA: Environmental Impact Assessment, G/A: Grant Agreement, IEE: Initial Environmental Examination, MoHS: Ministry of Health and Sports, MoPF: Ministry of Planning and Finance)

ANNEX 5

Major Undertakings to be Covered by the Japanese Grant

No	Items	Deadline	Cost Estimated (Million Japanese Yen)*	
1	To construct building and procure equipment		This page is closed due to the confidentiality	
	1) To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country			
	a) Marine(Air) transportation of the products from Japan and/or third countries to the recipient country			
	b) Internal transportation from the port of disembarkation to the project site			
	2) To construct access roads			
	a) Within the project site			
	3) To construct the temporary building			
	4) To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities			
	a) Electricity			
	- The drop wiring and internal wiring within the site			
	- The main circuit breaker and transformer			
	b) Water Supply			
	- The supply system within the project site (receiving and/or elevated tanks)			
	c) Drainage			
	- The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the project site			
	d) Furniture and Equipment			
	- Project equipment			
2	To implement detailed design, bidding support, supervision and soft component (Consulting service)			
3	Contingencies			
	Total			

*; The cost estimates are provisional. This is subject to the approval of the Government of Japan.

ANNEX 6

Total Estimated Costs to be Included in the Budget Proposal for Parliament's Approval

An executing agency of the Government of Myanmar is responsible for submitting a budget proposal to be approved for the next fiscal year's (FY) budget or the current year's supplementary budget. The budget proposal shall include both estimated costs borne by the Government of Myanmar and the grant borne by the Government of Japan. If the proposed budget spans multiple years, it must be appropriated and approved for each fiscal year.

*Expenses to be borne by the Government of Myanmar are subject to change depending on the progress of project implementation. The actual amount to be requested each FY shall be amended accordingly.

Dawei General Hospital

	FY2017	FY2018	FY2019	FY2020	FY2021
Expenses to be borne by the Government of Myanmar	14,504 Thousand MMK	323,069 Thousand MMK	11,849 Thousand MMK	554,701 Thousand MMK	3,483,951 Thousand MMK

This page is closed due to the confidentiality

Budget Preparation/Approval Process in Myanmar

Budget proposal for next fiscal year	Budget proposal for supplementary budget of current year	Process
August - October	September	Ministry of Health and Sports (MoHS) prepares and submits budget proposal to the Ministry of Planning and Finance (MoPF)
September - December	September - October	The Budget Department scrutinizes and compiles budget proposals, which are to be vetted by a Vice-President and submitted to the Financial Commission
December - January	October - November	The Financial Commission discusses the budget proposals and submits them to the Cabinet with recommendations
December - January	October - November	Union Budget Bill is discussed and approved by the Cabinet
January - March	November	Union Budget Bill is discussed and approved by Pyidaungsu Hluttaw
March	December	Union Budget Law is enacted by Pyidaungsu Hluttaw and approved by the President
April -	December	MoPF allocates budget to MoHS for execution

*The schedule is subject to change every year.

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX

20XX, Month

Organization Information

Authority (Signer of the G/A)	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Line Agency	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____

Outline of Grant Agreement:

Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____
Project Title	THE PROJECT FOR IMPROVEMENT OF DAWEI GENERAL HOSPITAL
E/N	Signed date: Duration:
G/A	Signed date: Duration:

1: Project Description

1-1 Project Objective

In response to the request from the Government of Myanmar, the Government of Japan dispatched a preparatory survey team to Myanmar for the Project from January to March 2016. Through a series of discussions, they confirmed that this hospital development project should be implemented based on the following principles:

- Universal design of facilities for providing patient-centered healthcare services;
- Effective utilization of existing buildings and harmonization with the JICA building based on a future development plan;
- Favorable educational environment provided to medical personnel including hospital staff and medical students; and
- Building design for disaster risk reduction to be adopted.

1-2 Necessity and Priority of the Project

- Consistency with development policy, sector plan, national/regional development plans and demand of target group and the recipient country.

In 2015, the Japan International Cooperation Agency (hereinafter referred as "JICA") conducted the Data Collection Survey for State/Regional Hub Hospitals in Myanmar in 2015. Based on the results of the Survey, two medical institutions, Magway General Hospital in the Magway Region and Dawei General Hospital (hereinafter referred to as "DGH") in the Tanintharyi Region, were selected as priority targets not only because they especially needed for the support but also because conditions such as securing a construction site was confirmed.

It is assumed that DGH will cover the Dawei Special Economic Zone, where the largest industrial complex in Southeast Asia is expected to be developed, and its surrounding residential areas. Also the Ministry of Health and Sports has decided to increase the number of sanctioned beds in DGH from 200 to 500 in 2016. Therefore, DGH is expected to play more important roles in regional healthcare.

Meanwhile, the existing condition of DGH is not sufficient for diagnosis and treatment of patients due to the deterioration and malfunction of facilities and equipment. Also, because of lack of facilities, medical equipment and medical specialists, some patient are not received or some are referred to other higher medical institutions in Yangon in order to take advanced medical service, approximately 670km away from DGH. In this sense, DGH cannot fulfill its responsibilities as a regional hub hospital.

In these circumstances, the Project will aim to enhance the medical services of DGH as a regional hub hospital in Tanintharyi Region, which contributes to uplifting life of the nation in Myanmar.

In order to achieve above-mentioned objectives, the Project will construct the JICA building consisting of an operation theatre complex where emergency patients can be treated appropriately, and a physiology department, a diagnostic imaging department and a laboratory, used by not only outpatients but also inpatients on the existing premises of DGH as well as provide equipment required for appropriate medical services.

1-3 Effectiveness and the indicators

- Effectiveness by the project

Quantitative Effect (Operation and Effect indicators)		
Indicators	Original (Yr 2016)	Target (Yr 2024)
The annual number of examinations with CT by the Japan side	- (993 by existing CT)	1,590
The annual number of MRI examinations	-	373
The annual number of surgical operations	4,354	5,878

Qualitative Effect

1. Emergency patients get effectively treated through improved patient and staff flow including swift patient transfer to the new CT room and operation theatre complex.
2. Operations in the clean environment are performed with the operation theatre complex.
3. Diagnostic capacity at DGH is enhanced through the improvement of medical and health care services.
4. Clinical practice environment is improved at DGH through equipment and building construction.

2: Project Implementation

2-1 Project Scope

Table 2-1-1a: Comparison of Original and Actual Location

Location	**Original:** *(M/D)* Dawei General Hospital in the Tanintharyi Region **Attachment(s):Map**	**Actual:** *(PMR)* **Attachment(s):Map**

Table 2-1-1b: Comparison of Original and Actual Scope

Items	Original	Actual
New building at DGH	Main building : Total: 6,560m² 2-story, Reinforced concrete structure, 6,090m² Ancillary facilities and structures: Reinforced concrete structure: a generator hut, a blower hut and a ramp, 310m², Wooden Structure: a connecting corridor, 160m² Departments: Outpatient department, Diagnostic imaging department, Laboratory unit, Endoscopy unit, Operation theatre complex, ICU, and Central sterile supply department.	*(PMR)*
Equipment	Medical equipment which is required installation work	Please state not only the most updated schedule but also other past revisi ons chronologically.
Soft Component	Improvement of medical equipment maintenance capability, and how to construct images by MRI and CT etc.	All change of design shall be recorded regardless of its degree.

2-1-2 Reason(s) for the modification if there have been any.

(PMR)

2-2 Implementation Schedule

2-2-1 Implementation Schedule

Table 2-2-1: Comparison of Original and Actual Schedule

Items	Original		Actual
	DOD	G/A	
Cabinet Approval	Nov 2017		
E/N	Dec 2017		*(PMR)*
G/A	Dec 2017		As of (Date of Revision)
Detailed Design	Mar 2018 - Jan 2019		
Bidding Notice	Mar 2019		
Bidding	May 2019		Please state not only the most updated schedule but also other past

			revisions chronologically.
Construction Period	Jul 2019 - Feb 2021		
Installation of Equipment	Jan 2021 - Feb 2021		
Soft component	Jan 2021 - Feb 2022		
Project Completion Date*	Feb 2021		
Defect Notification Period	Feb 2022		

*Project Completion was defined as _____ at the time of G/A.

2-2-2 Reasons for any changes of the schedule, and their effects on the project.

2-3 Undertakings by each Government

2-3-1 Major Undertakings

See Attachment 2.

2-3-2 Activities

See Attachment 3.

2-3-3 Report on RD

See Attachment 4.

2-4 Project Cost

2-4-1 Project Cost

Table 2-4-1a Comparison of Original and Actual Cost by the Government of Japan
(Confidential until the Bidding)

Items			Cost (Million Yen)	
	Original	Actual	Original	Actual
Construction Building	Main building : Total: 6,560m² 2-story, Reinforced concrete structure, 6,090m² Ancillary facilities and structures: Reinforced concrete structure: a generator hut, a blower hut and a ramp, 310m², Wooden Structure: a connecting corridor, 160m² Departments: Outpatient department, Diagnostic imaging department, Laboratory unit, Endoscopy unit,	This page is closed due to the confidentiality		Please state not only the most updated schedule but also other past revisions chronologically.

	Operation theatre complex, ICU, and Central sterile supply department.			
Equipment	Medical equipment which is required for installation work			
Consulting Service	- Detailed design -Bidding support - Supervision - Soft Component			
Contingencies				
Total				

Note: 1) Date of estimation: April 2017
2) Exchange rate: 1 US Dollar = 114.60 Yen
1MMK=0.08371Yen

Table 2-4-1b Comparison of Original and Actual Cost by the Government of Myanmar

Items			Cost (Thousand MMK)	
	Original	Actual	Original	Actual
Construction works	Level the ground of the Project site including demolition of existing buildings and removal of trees		46,928	Please state not only the most updated schedule but also other past revisions chronologically.
	Relocate existing wiring and piping system		5,322	
	Obtain building permit		270,819	
	Install high voltage lines and a service drop for the JICA building		3,630	
	Obtain approval of IEE/EIA if applicable		13,690	
	Planting and gardening works around the JICA building		17,919	
	Construction of two connecting corridors		752,625	
Equipment procurement	Procure and install general furniture		118,401	
	Procure and install equipment, and transfer existing equipment		3,102,294	
Soft Component	Per diem, accommodation and transportation fee for Soft Component Program attendees		7,803	
Administrative procedures	Allocate necessary staff		16,885	
	Commissions for Authorization to Pay, and		31,758	

	payment to a consultant and contractors			
Total			4,388,074	

Note: 1) Date of estimation: April 2017
2) Exchange rate: 1 US Dollar = 114.60 Yen
1MMK=0.08371Yen

2-4-2 Reason(s) for the wide gap between the original and actual, if there have been any, the remedies you have taken, and their results.

(PMR)

2-5 Organizations for Implementation

2-5-1 Executing Agency:

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original: *(M/D)*
Actual, if changed: *(PMR)*

2-6 Environmental and Social Impacts

- The results of environmental monitoring as attached in Attachment 5 in accordance with Schedule 4 of the Grant Agreement.
- The results of social monitoring as attached in Attachment 5 in accordance with Schedule 4 of the Grant Agreement.
- Information on the disclosed results of environmental and social monitoring to local stakeholders, whenever applicable.

3: Operation and Maintenance (O&M)

3-1 O&M and Management

- Organization chart of O&M
- Operational and maintenance system (structure and the number ,qualification and skill of staff or other conditions necessary to maintain the outputs and benefits of the project soundly, such as manuals, facilities and equipment for maintenance, and spare part stocks etc.)

Original: *(M/D)*

(1) Operation Structure

It is necessary to deploy staff in each department as shown in Table 3-1 so that the new building and equipment under the Project can be utilized appropriately and the required level of medical services can be achieved. It is required to increase the number of medical staffs generally in DGH as the number of beds and operation theatres increases. Particularly specialists such as surgeons, orthopedic surgeons and anesthesiologists, as well as medicine doctors and surgeons who are able to operate endoscopes, medical equipment maintenance engineer and nurses need to be increased in their numbers.

Furthermore it is mentioned in the "Hospital Management Manual" issued in 2011 by Ministry of Health (as of 2011) that the deployment of medical equipment maintenance engineers is mandatory in order to maintain the medical equipment in order.

Table 3-1 Necessary Staff for the Project Implementation

Category	Specialty OPD											Operating Theatres														
	Medicine	Obstetrics	Gynecology	Surgery	Orthopedic	Pediatrics	Dental	Psychiatric	Dermatology	Eye	ENT	Surgery	Obstetrics	Orthopedic	ENT	Eye	Anesthesiology	ICU	Sterilization	Endoscopy	Laboratory	Diagnostic imaging Dept.	Pharmacy	Medical record	Medical social	Medical engineer
[Doctors]																										
Senior Consultant							1			1		1	1	1		1	1				1	1				
Junior Consultant								1	1		1	1		1	1		1	2		2	1					
Specialist Assistant Surgeon				1	1								1				1									
Assistant Surgeon	2	1	1	1	1	2	2					2	1	2			2			2	1	1				
Sub Total	2	1	1	2	2	2	3	1	1	1	1	4	3	4	1	1	5	2		4	3	2				
Total	46																									
[Nurses]																										
Chief Nurse												2														
Staff Nurse	2	1	1	2	2	2	1	1	2	1	1	12						4								
Trained nurse	4	2	2	4	4	4	2	2	1	2	2	26						8		2						
Sub Total	6	3	3	6	6	6	3	3	3	3	3	40						12		2						
Total	99																									
[Others]																										
Sterilization worker	1																		2							
Radiology technicians	2																					2				
Laboratory technicians																					25	5				
Medical social worker																									1	
Medical equipment maintenance engineer																										1
Pharmacist																							1			
Assistant pharmacist																							2			
Senior Clark																								2		
Junior Clark																								1		
Worker	4	2	2	4	4	4	2	1	1	1	1	8						3	2	1	2	2	2	2	1	2
Sub Total	7	2	2	4	4	4	2	1	1	1	1	8						3	4	1	25	9	5	5	2	2
Total	96																									
Total Manpower	241																									

(2) Maintenance System

- Building

Currently an electrical technician who is also in charge of plumbing installation is assigned for basic building maintenance in DGH. Complicated maintenance and repair works which they cannot cope with are outsourced through the medical superintendent of DGH. The technicians will be able to conduct daily maintenance works for the JICA building, on the other hand repair of building elements and periodical inspections requiring expertise etc. will be outsourced as is with the existing condition.

- Equipment

Currently there is no staff working for equipment maintenance. In case malfunction of equipment occurs a repair request is made through the medical superintendent of DGH to CMSD (the Central Medical Stores Department) under the Department of Medical Services, MoHS. In case even CMSD cannot repair the equipment, CMSD calls the local agent and ask them to repair it.

At the completion of the Project, a medical equipment maintenance engineer is expected to be deployed for DGH.

(3) Facility maintenance plan

The maintenance of facilities is categorized into two types: (i) daily cleaning and (ii) repair of parts from wear and tear, damage, and deterioration. The daily cleaning will be able to behavior which handles facilities carefully as well as early detection of damages and/or malfunctions. The repair of facilities mainly consists of the renovation and restoration of the interior and exterior finish on the structure. Facilities should be refurbished every decade to retain their functions. Items for regular inspection and repair which affect the lifespan of facilities will be presented in the Maintenance Manuals submitted by the contractor at the commissioning of the facilities. Detailed inspection and cleaning methods will be also explained at that time.
Regular inspection points are summarized in Table 3-2 below.

Table 3-2 Summary of regular inspection points of the building

	Inspection and maintenance points	Frequency
Exterior	Restore and repaint exterior walls	Repaint every 5 years; restore every 3 years
	Inspect and restore roofs	Inspect every 3 years; Restore every 10 years
	Clean gutters and drainage surroundings regularly	Every year
	Inspect and repair exterior door and window sealants	Every year
	Inspect and clean ditches, manholes, etc.	Every year
Interior	Renovate the interior	As necessary
	Restore and repaint partition walls	As necessary
	Replace ceiling materials	As necessary
	Adjust doors and windows to fit the openings	Every year
	Replace door handles, hinges, etc.	As necessary
	Periodical inspection for elevators	once 3 months

(4) Building Equipment maintenance plan

Daily preventive maintenance before there arises a need to repair defects and replace parts is important for maintain building equipment. Its lifespan can be extended by normal operation and daily inspection, lubrication, tune-up, cleaning, and repair. Daily maintenance can prevent defects and accidents as well as chain reactions.

Equipment such as a backup generator and water pumps needs periodical inspection and maintenance. It is important for these kinds of equipment to have annual inspection. The general lifespan of major building equipment is shown below inTable3-3.

Table 3-3 Lifespan of building equipment

	Equipment	Lifespan
Electrical installations	Distribution board	20~30 years
	LED lamp	20,000~40,000 hours
	Fluorescence lamp	5,000~10,000 hours
	Backup generator	30 years
Plumbing installations	Pump, pipe and valve	15 years
	Tank	20 years
	Sanitary appliance	25~30 years
Air conditioning and ventilation installations	Pipe	15 years
	Exhaust fan	20 years
	Air conditioner	10 years

(5) Equipment maintenance plan

It is necessary to establish the maintenance formation in the Department of Medical Services, MoHS and DGH based on the requirements for the medical equipment and medical furniture maintenance described in the "Hospital Management Manual" issued in 2011 by Ministry of Health (as of 2011). The proposed maintenance formation is shown in Table 3-4. The medical equipment is categorized into operation theatre, labor room, radiology, clinical laboratory, ICU, laundry and others in the manual mentioned above.

Table 3-4 Proposed Maintenance Formation

The scope of Department of Medical Services, MoHS	The Scope of Administration department in DGH	The Scope of Maintenance department in DGH
・To create maintenance plan ・To ensure and allocate the budget ・To create personnel deployment plan ・To create personnel training plan	・To arrange the budget requests from each clinical department and apply them to MoHS ・To apply personnel plan ・To manage inventory list ・To hear the situation from each clinical department ・To share the information with MS and other administrators (Regular Report) ・To plan and implement training (Medical staff, Technicians) ・To ask the local agent to repair (Order to manufacturer local agent)	・To clarify the scope of work of MS/ the person in charge of the maintenance/ end-users ・To manage the inventory list of each clinical department ・To instruct on the equipment usage to end users (including daily check and periodical check) ・To confirm the lack of parts and consumables ・To report the serious malfunction(to the Administration and ask them to apply the repair request) ・To adjust or repair the equipment with not so serious malfunction ・To identify the malfunction parts ・To inspect the repaired equipment on receipt ・Notes (for each department) Operation Theatre : ・To maintain the medical gas station under the supervision of anesthetist, to conduct basic maintenance, ・To maintain medical electronic devices Labor room : ・the same scope as operation theatre Radiology : ・To maintain the electrical system by Electrician ・To clean up the equipment under the supervision of radiologist Laboratory : ・To call CMSD(Central workshop) in case Blood Bank Refrigerator do not work well, ICU: ・To maintain the medical gas pipe and ICU equipment by qualified technician Laundry : ・To conduct basic maintenance for electrical equipment

Currently there are some problems with medical equipment maintenance in DGH such as that daily check is not conducted based on standardized procedure and it is not conducted in a planned manner. Soft Component program will be included in the Project considering problems mentioned above in order to improve the maintenance management system.

Actual: *(PMR)*

3-2 **O&M Cost and Budget**

- The actual annual O&M cost for the duration of the project up to today, as well as the annual O&M budget.

Original: *(M/D)*

Annual operation and maintenance cost for the new building and equipment under the Project is estimated as shown in below.

Table 3-5 Estimated operation and maintenance cost (thousand MMK per year)

Item	Estimated expenditures after completion of the Project
1) Human resource	101,310
2) Electricity	60,195
3) Fuel	21,157
4) Medical gas	0
5) Building maintenance	21,812
6) Medicine	269,273
7)Medical material cost	49,555
8) Consumables for the equipment	48,467
9) Maintenance cost for diagnostic imaging equipment	49,928
Total	621,697

4: Precautions (Risk Management)

- Risks and issues, if any, which may affect the project implementation, outcome, sustainability and planned countermeasures to be adapted are below.

Original Issues and Countermeasure(s): *(M/D)*	
Potential Project Risks	Assessment
1.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
2.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:

	Contingency Plan (if applicable):
3.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
Actual issues and Countermeasure(s)	
(PMR)	

5: Evaluation at Project Completion and Monitoring Plan

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan for the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Undertakings to be taken by each Government
3. Monthly Report
4. Report on RD
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (Final Report Only)

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2017	2nd ●month, 2017	3rd ●month, 2017	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

-
-
-

Attachment 7

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Medical Equipment and Furniture Transfer Schedule

Work			2020				2021						
			Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Japan side	Construction Work (20 months)								Completion of construction work & equipment work				
	Equipment Work	Shipment											
		Installation & Operation Training											
	Soft Component												
Myanmar side	Necessary Staff	Allocation of Necessary Staff											
	General Furniture	Procurement Procedure (bidding, bidding evaluation, award, manufacturing)										Start operation	
		Delivery and Installation											
	Medical equipment and Medical Furniture	Procurement Procedure (bidding, bidding evaluation, award, manufacturing)											
		Installation including delivery											
		Transfer, Laboratory, first lot											
		Transfer, Laboratory, second lot											
		Transfer, Outpatient Department											
		Transfer, Diagnostic Imaging Department											
		Transfer, Operation Theatre Complex											
		Transfer, ICU											
		Transfer, CSSD											
	Construction of Two Connecting Corridors												
	Other works	Install high voltage line and a service drop for the JICA building											
		Planting and gardening works around the JICA building											

Note) the first lot and second lot for laboratory is as folow;

1) First lot is

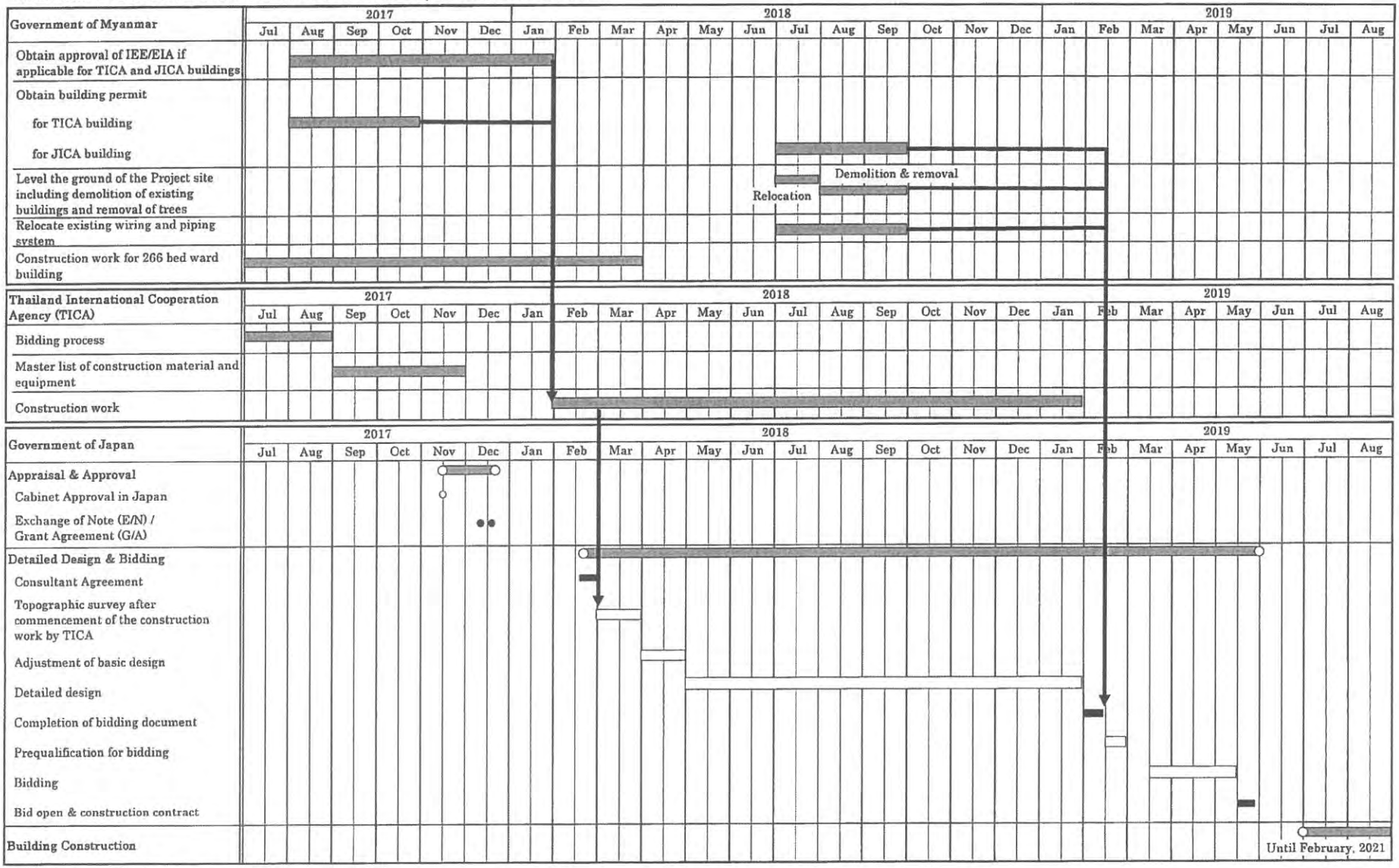
* **Minimum equipment to operate the laboratory**

Automated biochemistry analyzer , Water distiller , Centrifuge, Coagulation analyzer , Microscope
Blood bank refrigerator , Deep freezer for blood component storage , Micropipette set
Microscope , Centrifuge for serofuge , Platelet incubator with agitator,
Apheresis machine (blood component extractor), Blood cell counter , Blood gas analyzer
Leukocyte reduction machine , Thawing water bath , in total 16 items written in Annex 2 Medical Equipment and Medical Furniture List.

2) Second lot is remaining items written in Annex 2 Medical Equipment and Medical Furniture List.

*Other laboratory equipment such as
Histopathology , Microbiology , Blood donor area etc. in total 31 items

Tentative Construction Schedule of MoHS, TICA and JICA



※ schedule may be subject to change

ANNEX10

Necessary Staff for the Project Implementation

Category	Specialty OPD											Operating Theatres						ICU	Sterilization	Endoscopy	Laboratory	Diagnostic imaging Dept.	Pharmacy	Medical record	Medical social	Medical engineer
	Medicine	Obstetrics	Gynecology	Surgery	Orthopedic	Pediatrics	Dental	Psychiatric	Dermatology	Eye	ENT	Surgery	Obstetrics	Orthopedic	ENT	Eye	Anesthesiology									
[Doctors]																										
Senior Consultant							1			1		1	1	1		1	1				1	1				
Junior Consultant								1	1		1	1		1	1		1	2		2	1					
Specialist Assistant Surgeon				1	1								1				1									
Assistant Surgeon	2	1	1	1	1	2	2					2	1	2			2			2	1	1				
Sub Total	2	1	1	2	2	2	3	1	1	1	1	4	3	4	1	1	5	2		4	3	2				
Total	46																									
[Nurses]																										
Chief Nurse	2																									
Staff Nurse	2	1	1	2	2	2	1	1	2	1	1	12						4								
Trained nurse	4	2	2	4	4	4	2	2	1	2	2	26						8		2						
Sub Total	6	3	3	6	6	6	3	3	3	3	3	40						12		2						
Total	99																									
[Others]																										
Sterilization worker	1																		2							
Radiology technicians	2																					2				
Laboratory technicians																					25	5				
Medical social worker																									1	
Medical equipment maintenance engineer																										1
Pharmacist																							1			
Assistant pharmacist																							2			
Senior Clark																								2		
Junior Clark																								1		
Worker	4	2	2	4	4	4	2	1	1	1	1	8						3	2	1	2	2	2	2	1	2
Sub Total	7	2	2	4	4	4	2	1	1	1	1	8						3	4	1	25	9	5	5	2	2
Total	96																									
Total Manpower	241																									

5. Soft Component (Technical Assistance) Plan

Dawei General Hospital

Republic of the Union of Myanmar
"The Project for Improvement of Regional General Hospital"
Soft Component (Technical Assistance) Implementation Plan

1. Background of the Soft Component (Technical Assistance) Program

1-1 Objectives of the Soft Component (Technical Assistance) Program

In Republic of the Union of Myanmar (hereinafter referred to as "Myanmar") "Out of pocket reduction policy of health care service provided in public medical facilities" has been introduced since 2014 and the average number of outpatients increased about 2.7 times from 85.0 patients/day in 2013 to 233 patients/day in 2016, which is also followed by the 1.5[1] times increase of the average number of inpatients from 194 patients/day to 292 patients/day. Furthermore the number of operation was also steadily increased about 1.6[2] times from 2,723 cases in 2013 to 4,354 cases in 2016.

Currently in Dawei General Hospital (hereinafter referred to as DGH) the building of each department - outpatient, emergency unit, diagnostic imaging, operation theater complex, wards is built in vacant space of the site randomly and the flow of patients is not considered. There is a distance between outpatients department, emergency unit and diagnostic imaging department, operation theater complex which makes it hard for patients and medical personnel to move. Considering the situation above hospital area will be concentrated in the center and southern area of the site and the basic construction plan which secures the effective flow of patients was agreed by hospital side. In this project outpatients and central diagnostic functional departments will be improved and will be connected with emergency unit, which forms the unity of the hospital.

The objective of this project is to improve the educational environment of medical personnel and the quality of health care services through provision of necessary equipment for the facility and its operation.

1-2 Current conditions and issue of equipment utilization

In DGH the medical personnel who is end-user of medical equipment and his team or CMSD (Central Medical Stores Depot) staff under Department of Medical Services, Ministry of Health and Sports (hereinafter referred to MOHS) are supposed to maintain the equipment. The medical equipment maintenance activities by CMSD

[1] Source: "Hospital Statistics" Dawei General Hospital
[2] Source: "Hospital Statistics" Dawei General Hospital

depend on operation check such as daily check conducted by medical personnel and reports from them on malfunction with equipment. Medical personnel is supposed to request CMSD staff to repair the equipment through Medical Superintendent (hereinafter referred to as MS) if malfunction occurs. In case CMSD staff are not able to repair the equipment, each department head whose equipment became malfunction will ask local agent to repair it by phone call. Since Annual Maintenance Contract between the hospital and local agent is not concluded, it is usually delayed to dispatch the local agent engineer which makes it difficult to provide proper medical services. The contact information of local agent for the malfunction case and the warranty period will be well advised on hand over, however it is required to strengthen the maintenance system through the Soft Component (Technical Assistance) program.

(1) Current conditions of CMSD and maintenance support in the hospital

So far medical equipment maintenance staff is not deployed to DGH and end-users such as Physicians, nurses and co-medicals have to maintain medical equipment and they conduct daily-check of the equipment before using. In addition they manage the replacement parts and consumables such as a breathing circuit for ventilator or infusion set. Currently, Annual Maintenance Contract between the hospital and local agent is not concluded. Hospital administrative officers well recognize the importance of maintenance contract for the medical equipment which requires the advanced maintenance, however it seems that they are on the process of development of their knowledge about how to decide the scope of services and requirements.

As of July 2016, two staffs (civil engineer, electrical engineer) have been assigned to DGH from MOHS and they are in charge of maintenance of the facility and medical equipment. However they do not have enough experience, as they just graduated university in faculty of engineering. MOHS provided training in order to educate medical engineers and to dispatch 53 candidates of medical engineers to hospitals with more than 200 beds and other government facilities.

There are 6 staff include a chief engineer, an assistant engineer and electrical engineers working at CMSD. In Myanmar CMSD plays key role in medical equipment maintenance. Before 2012 there was only equipment easy to handle even in top referral hospitals. Thus, technical level of CMSD was on the process of development and they could only cope with minor malfunction with essential equipment, such as oxygen concentrator, oxygen central piping, high pressure steam sterilizer and suction machine. Furthermore, there was no management tool such as analyzer and tester etc. for medical equipment, they could act only after they received request to repair from

the hospital.

MOHS is procuring medical equipment on a large scale since 2012 and diagnostic imaging equipment such as CT scanner has been installed at state level hospitals including DGH. The manufacturers of these kinds of advanced medical equipment allow only engineers trained by the manufacturers (hereinafter referred to "qualified engineer") to provide maintenance services such as periodic check or repair according to PL law （Product Liability law） in the country where head quarter of the manufacturer exists. Engineers from CMSD are on the process of development of their skills, so they cannot cope with serious problems and cannot conduct periodic check.

CMSD, as a medical service department managing and providing comprehensive service of procurement and maintenance, is required to enhance the ability of integrated management of each equipment status (working or not working) and plan the replacement of the equipment in which many cases of malfunction occurs and whose repair cost is high in accordance with people concerned in the hospital so that the equipment can be used in good condition for long time. They are also expected to provide preventive maintenance services more actively even from a distance based on the procured equipment management database. Furthermore, hospital administrative officers are expected to enhance their knowledge and skills on the scope and requirements of Annual Maintenance Contract in order to conclude it in a proper manner.

(2) Current conditions of maintenance services from local agent

In DGH maintenance services are provided by the local agent based in Yangon which concludes the contract with manufacturer. Engineers from local agent are well qualified having training at the head quarter of manufacturer or local agents at neighboring Thailand or Singapore, so they can cope with malfunction. In this project the local agent in Yangon will provide maintenance service to DGH. Warranty period is one year after the handover of the equipment except CT scanner and the equipment will be repaired for free in case malfunction occurs during this period. Before warranty period expires the instructor of the Soft Component (Technical Assistance) Program and the person in charge of the equipment maintenance are supposed to confirm whether the equipment is working in order or not and request a manufacturer to repair the equipment for free if necessary, which enables to confirm all equipment supplied under this project is working in order. As for CT scanner supplied under this project, three years maintenance service contract will be provided and, periodic check and one time replacement of X-ray tube are included.(refer to (5). below.)

Generally, public hospitals including DGH do not conclude the Annual Maintenance Contract[3] with local agent and public hospitals request a repair on an on-call basis every time malfunction occurs. During busy season local agents may give a priority of on-call service to the private hospital with which they conclude the maintenance contract.

Annual Maintenance Contract includes periodic check. If the equipment is checked periodically, the parts are replaced properly and local agent can well know about the equipment condition. Thus, malfunction is unlikely to occur and even if malfunction occurs it is easy to repair it. DGH does not conclude maintenance contract and the equipment in DGH is not checked periodically, so malfunction in progress may get worse.

In order to improve this situation the hospital needs to select the equipment to be maintained under the Annual Maintenance Contract on a priority basis in each department and ensure the budget for the contract with local agents.

(3) Current conditions of utilization of supplied equipment

Medical staff in DGH can operate and utilize existing equipment and they have clinical experiences using those equipment. Therefore, they can operate the equipment very well. On the other hand, they are not well trained how to perform preventive maintenance activities to find out the malfunction of the equipment due to aging through daily check and to take necessary preventive measures. In the Wards of each clinical department, operation theater complex and diagnostic imaging medical staff check the equipment by appearance daily, however they do not have a regular maintenance check sheet to record the status. Thus, the method of check and the items to be checked are different from staff to staff and it cannot be said that they check the equipment in a standardized way. Moreover, they inform next shift staff of the status of the equipment only verbally that makes it difficult to share the information exactly. There is no periodic check support by the qualified engineers from the local agent, so preventive maintenance services are not provided well and necessary parts are not replaced at appropriate timing.

The initial operation guidance for the equipment provided under the grant aid project will be conducted by the supplier or the manufacturer. However, the duration of the guidance is only in less than an hour and main contents of the guidance are about its operation, so it is difficult for every end-users to learn the method of daily check and

[3] Medical equipment maintenance contract will be engaged between hospital and local agent after applying necessary budget to Ministry of Health and Sports. There are two kinds of contract. One is Comprehensive Maintenance Contract includes cost of spare parts, and another is Annual Maintenance Contract including only repair service.

trouble-shooting in detail. It is important to support further the preventive maintenance activity such as daily check and trouble-shooting that is not covered by the initial operation guidance so that the supplied equipment can be used in good condition for long time. In the diagnostic imaging department of DGH, one radiologist and three co-medicals (radiology technician) are working and they can construct and read the image of 16-slice CT introduced in 2015, which indicates that they have basic knowledge of multi slice scanner operation. However in this project an open type MRI (0.35-0.4 Tesla) and 32-row, 64-slice CT are planned to be provided and it is also planned to provide Soft Component (Technical Assistance) Program where a clinical radiology instructs how to construct the image and how to operate, maintain and calibrate the equipment in addition to the initial operation training conducted by a supplier.

(4) Analysis of the issues concerning equipment utilization

Considering the items (1) ~ (3) above there are the following four issues in order to launch the project smoothly and ensure the sustainability of the supplied equipment:

① It takes time to get to know about the malfunction of each equipment, as CMSD and hospital administrative officers (MS or Deputy MS) are on the process of development of management capability in regard with the status of equipment.
② Annual Maintenance Contract is not concluded as CMSD in charge of maintenance is not well trained to conclude the contract and as the budget for the contract is not ensured in the hospital, which leads to interruption of medical services due to equipment malfunction.
③ Preventive maintenance such as daily check or periodic check is not conducted in a regular way, which makes the malfunction of the equipment worse and the life time of the equipment shorter.
④ DGH staff have no experience to operate permanent magnetic MRI and 32-row 64-slice CT, it is required to learn how to construct the images for each part and how to maintain and calibrate the equipment. Furthermore application method of gastrointestinal examination using fluoroscopic X-ray machine and endoscope (e.g. ERCP: Endoscopic retrograde cholangiopancreatography) and urine volume measurement will be instructed, which is expected to increase the frequency of use of the equipment.

(5) Warranty period and Maintenance Service Contract

Warranty period and maintenance service contract for the equipment procured under

this project is mentioned in the following table.

Table　Planned Equipment List

No.	Name	Qty	Warranty period and Maintenance contract
1	Operation lamp　A（dual lamp type, for major surgery)	4	One year universal warranty
2	Operation lamp　B（single lamp type, for minor surgery)	2	One year universal warranty
3	CT Scanner	1	One year universal warranty and three year maintenance contract
4	Dental unit	2	One year universal warranty
5	ENT unit	1	One year universal warranty
6	Fluoroscopy X-ray machine	1	One year universal warranty
7	General X-ray machine	1	One year universal warranty
8	Hand scrub station	3	One year universal warranty
9	High pressure steam sterilizer L	1	One year universal warranty
10	High pressure steam sterilizer M	1	One year universal warranty
11	MRI unit*	1	One year universal warranty
12	Warm cabinet	1	One year universal warranty
13	Film viewer　(for 1 film)	10	One year universal warranty
14	Film viewer　(for 2 films)	4	One year universal warranty

*MRI unit is permanent magnet type which is maintenance free and there is no possibility of quench. Thus, there is no maintenance contract planned under this project.

Contents of three year maintenance contract for CT scanner is as follows;

・Warranty period is one year after handover　of the equipment.

・Second and third year maintenance services are included such as one time replacement of recommendable spare parts, periodic check every three month in total 4 times in a year, one time replacement of X-ray tube during three years, and any time on call maintenance services.

2.　The objective of the Soft Component (Technical Assistance) Program

The objective of the program is that the person in charge of medical equipment maintenance assigned by MS and his/her team are expected to learn to manage the status of each equipment (working or not working) by referring to integrated equipment management data base for the equipment provided to DGH. Also they are expected to learn to conduct preventive maintenance activity such as daily check or periodic check for providing medical services of constant quality. Furthermore as for MRI and CT supplied under this project they will learn how to construct the images for each part, how to maintain and calibrate the equipment. Another objective is that Annual

Maintenance Contract is to be concluded and applied according to clinical importance in order to reduce the downtime of the equipment and to provide medical services continuously. In addition radiologist and co-medicals (radiology technician) are expected to learn how to use the supplied equipment and how to obtain required images according to each disease through the training for them, which enables doctors to make more precise diagnoses.

CMSD is expected to learn the contents of maintenance activities conducted in regional hospital (especially the method of maintenance and its formation) and learn to manage the smooth and effective maintenance activity, as they will support and manage the maintenance activities conducted by the person in charge at regional hospitals such as DGH on an on-call basis.

3. Result of the Soft Component (Technical Assistance) Program

3.1 The person in charge of medical equipment maintenance, his team, CMSD and hospital administrative officers (MS or Deputy MS) can manage the status of each equipment (working or not working) referring to the equipment management data base and they can plan the replacement of the equipment with which many cases of malfunction occurs .

3.2 DGH can understand more about the type, contents and requirements of the maintenance contract and the contract can be concluded for high-priority medical equipment. Also the concluded maintenance contract can be utilized properly, periodic check can be conducted and the equipment can be repaired when malfunction occurs.

3.3 The equipment can be used safely for long time through implementation of preventive maintenance such as daily check by end-users and periodic check by local agent.

3.4 The scope of each party in charge of medical equipment maintenance (Hospital administrative officers, the person in charge of medical equipment maintenance and his /her maintenance team, CMSD, end-users) can be clear and the malfunction of the medical equipment can be found in early stage and repaired shortly.

3.5 The method of how to construct the images for diagnosis and how to maintain and calibrate the equipment will be acquired for supplied MRI and CT so that these equipment can be used effectively.

4. The method of achievement confirmation

The achievement of the program is confirmed in the following way:

Table1 The method of achievement confirmation

The method of achievement confirmation	Corresponding items in "Result of the Soft

	Component Program"
(1) Paper proficiency test	3.1、3.2、3.3
(2) The status of utilization (update) of integrated equipment management data base	3.1
(3) The procurement plan of replacement parts and consumables (including vendor list)	3.1
(4) The status of the conclusion of Annual Maintenance Contract with local agent (including periodic check)	3.2
(5) The budget plan for the Annual Maintenance Contract and its application status	3.1、3.2
(6) Creation of daily check sheet for each equipment	3.2
(7) Flow chart for repair in case malfunction occurs	3.4
(8) Medical equipment maintenance manual, Content comprehension scale	3.4
(9) Number of diagnostic imaging photography	3.5
(10) Construction of images for each part*	3.5

*Construction of images for each part will be confirmed in the third session of the Soft Component (Technical Assistance) Program, as it is difficult to confirm the ability immediately after the handover.

5. Implementation Plan of Soft Component (Technical Assistance) Program

The Soft Component Program will be conducted in three sessions. The reason for it is as follows:

① Medical staff can understand what is unclear about the maintenance of the equipment only after they started to use the equipment in the actual clinical activity. As for MRI and CT scanner, they will have clear question only after they construct images for many disease cases in actual practice.

② Medical staff can understand what is unclear about the use of preventive maintenance check sheet only after they started to use it in the actual clinical activity. As for MRI and CT scanner, it is necessary to calibrate it after a certain period of use, thus training after some interval will be effective.

③ The negotiation for conclusion of maintenance contract will be done just before the warrant expires, so Soft Component Program should be held at appropriate timing. Also maintenance contract should be chosen according to the frequency of the use.

Expected attendees are hospital administrative officers (MS or Deputy MS), end-users of provided equipment (physicians, nurses, co-medicals) the person in charge of medical equipment maintenance and his/her maintenance team. Engineers from CMSD, who are in charge of medical equipment maintenance in DGH, are also expected to join the program. Medical staff have shift work, thus we should arrange the training so that medical staff from each shift can join it. The program will be held in DGH.

The photos and movies of the practical training of the program will be taken and shoot and they will be presented to staff in CMSD head office so the contents of the program can be ingrained for them as a technical knowledge.

The program contents at DGH are different from the part of one at MgGH, However the outcomes from the Program at MgGH can be shared at DGH and it is encouraged to use it.

Table2　Targeted Equipment List for Soft Component (Technical Assistance) Program

No.	Name	Qty.	Outpatient	Diagnostic Imaging	OT Complex	CSSD
1	Ceiling Lamp A	4			4	
2	Ceiling Lamp B	2			2	
3	CT Scanner	1		1		
4	Dental Unit	2	2			
5	ENT Unit	1	1			
6	Fluoroscopy X-ray machine	1		1		
7	General X-ray machine	1		1		
9	High pressure steam sterilizer L	1				1
10	High pressure steam sterilizer M	1				1
11	MRI unit	1		1		

Table3　Expected attendees of Soft Component (Technical Assistance) Program

Organization	Title	Number of attendees	Contents
DGH	Hospital administrative officer（MS, DMS）	1	・Explanation on medical equipment management plan ・Presentation of supplied equipment ・Equipment Maintenance
	Radiologist, Radiology technician	2	・Practice of appropriate photography method ・Construction of images ・Maintenance and calibration

Organization	Title	Number of attendees	Contents
	Person in charge of medical equipment maintenance and his team	3	・Management of periodic check(every half year) ・Maintenance of equipment and its replacement ・Long term procurement of consumables ・Update of integrated equipment management data base ・In case malfunction occurs, how to take action.
	End users（Physicians, nurses）	5-10 from each department	・The effectiveness, quality and safety of medical equipment ・Necessity of medical equipment check before/after use ・Presentation of supplied equipment
CMSD	Engineers, Electrical technician	At least 2	・Creation and utilization of equipment management data base ・Daily check and periodic check ・Plan of procurement of consumables ・MRI/CT operation

Table4　Implementation Plan of Soft Component (Technical Assistance) Program

Session	Result	Description	DGH	CMSD	Implementation period
The First Session	3.1	Creation and utilization of the integrated equipment management data base by the person in charge of procured medical equipment maintenance and his maintenance team and by each clinical department	○	○*	2 (two) weeks before the installation starts *Only utilization of the integrated equipment management data base will be instructed
		Creation of maintenance sheet for each equipment(Procurement year, Manufacturer, Model, History of malfunction, Working or not working time, Performance record, History of periodic check)	○		
	3.2	The Points of daily check, instruction of how to use the regular maintenance check sheet	○	○	
	3.3	Instruction for utilization of each equipment (Introduction of clinical use)	○		

		Instruction for the selection of the type, requirements and cost of maintenance contract, Scrutiny of maintenance contract according to the budget, frequency of use and situation of service	○	○	
		The frequency and contents of periodic check for each equipment	○	○	
		Instruction for the procurement plan of periodical replacement parts and consumables for each equipment, creation of vendor list. Instruction for long term plan of equipment budget, support for application for maintenance fee, procurement of replacement parts and consumables according to procurement plan after the approval of the budget by MOHS, ensuring equipment maintenance and operation	○	○	
	3.5	Instruction for MRI/CT operation (image construction for each part and preventive maintenance, introduction of images of diseases, analysis method for each part), Instruction for method of gastrointestinal examination using fluoroscopic X-ray machine and urine volume measurement	○	○	
The Second Session	3.1 3.2 3.3	Practical Training using each maintenance check sheet created in the first session (simulation), Identification of issues and problems and instruction for the improvement.	○		6 (six) months after the installation
		Planning　procurement plan of replacement parts and consumables	○	○	
	3.5	Instruction for MRI/CT operation and review of MRI/CT preventive maintenance and safety management, review of method of gastrointestinal examination using fluoroscopic X-ray machine	○	○	

The Third Session	3.2 3.3	Instruction for long term plan of equipment budget, creation of the budget, support for application for maintenance fee, procurement of replacement parts and consumables according to procurement plan after the approval of the budget by MOHS, ensuring equipment maintenance and operation	○	○	11 (eleven) months after the installation (one month before warranty period expires)
	3.4	Review of the maintenance method using maintenance check sheet, Identification of issues and problems, instruction for improvement.	○	○	
		Instruction for creation of the procurement plan of replacement parts and consumables	○	○	
		Clarification of the scope of each party in charge of maintenance including CMSD, practice of medical equipment maintenance based on the scope	○	○	
		Advice for repair during warranty period and conclusion of maintenance contract	○	○	
		Advice for utilizing maintenance contract	○	○	
		Scrutiny of maintenance contract, support for contract conclusion, evaluation of validity according to the price	○	○	
		Creation of medical equipment maintenance manual, Clarification on the difference between malfunction repair during warranty and after the warranty	○	○	

Currently CMSD is in charge of procurement and delivery of medical equipment for each medical facility. CMSD procures replacement parts and consumables together with main unit of the equipment, however they do not know exactly how many replacement parts and consumables are used and how many of them are left as a stock. This situation causes the each hospital not to be able to plan their procurement in proper manner.

CMSD has to inform each hospital of the price and supplier of replacement parts or consumables so that each hospital can plan the budget for them. CMSD is expected to understand the process of equipment maintenance, develop the maintenance system and well manage it, so the training shown above 3.1 to 3.4 is critically important for CMSD staff in charge of DGH.

6. Instructor of the Soft Component (Technical Assistance) Program

There is no system of certification of biomedical engineers by the Government of Myanmar, so it is difficult to use local resource as an instructor. An instructor with comprehensive knowledge on medical equipment safe usage and its maintenance with rich practical and management experience from Japan will be selected. The instructor will conduct training based on the maintenance and safety usage practice performed at Japanese medical facilities, and apply these to target facilities by reflection on educational materials in order to enhance effectiveness of soft component. The following personnel will be dispatched for the program:

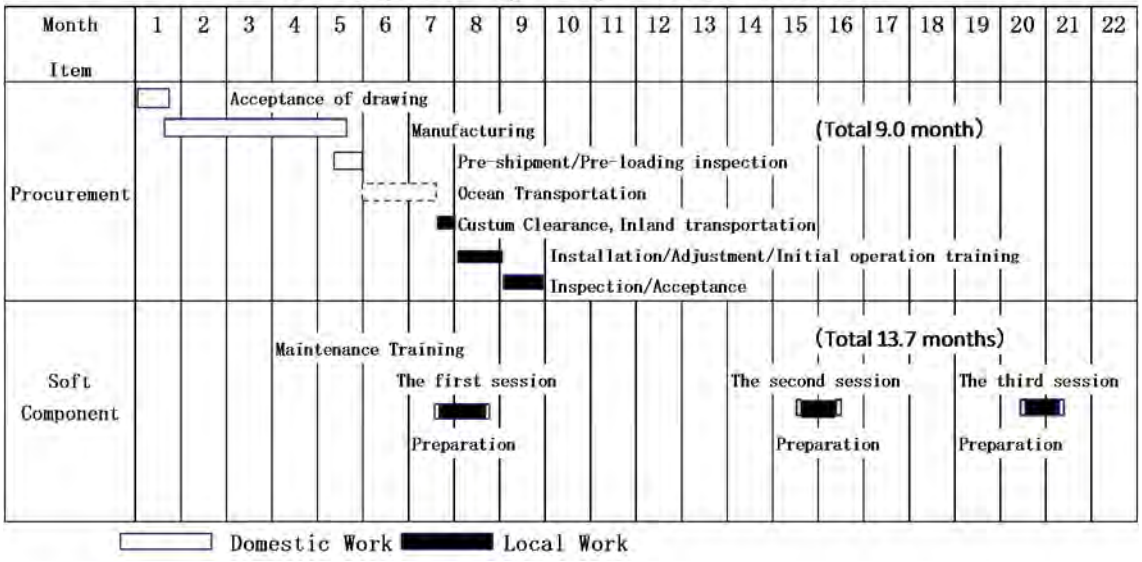
●Medical Equipment Maintenance Instructor (1 person) :
Who has rich experience of medical equipment maintenance in the medical facilities in developing countries.
● Soft Component (Technical Assistance) supervisor/Assistant Instructor (1 person) :
Who can create and improve the material for Soft Component Program, arrange the training, create the attendee list and edit the photos and movies.
●Radiographer (1 person)

The interpreter from English to Burmese will be deployed in order to enhance the participants understanding.

7. Implementation Schedule of Soft Component (Technical Assistance) Program

The first session is held two weeks before the installation work starts and it takes about 0.93 month (28 days). The second session is held 6 months after the installation and it takes about 0.73 month (22 days). The third session takes place 11 months after the installation and it takes 0.70 month (21 days). Totally it takes 13.7 months to complete whole Soft Component Program including preparation.

Soft Component Program Implementation Schedule



8. The outcome of Soft Component (Technical Assistance) Program

The following document will be submitted as outcome of Soft Component Program

The method of achievement confirmation
(1) The result of the paper test of skill proficiency
(2) The status of the daily check using a regular maintenance check sheet
(3) Update of integrated equipment management data base and use of equipment registration sheet
(4) The procurement plan of replacement parts and consumables
(5) Vendor list of replacement parts and consumables
(6) Order history of replacement parts and consumables
(7) The Annual Maintenance Contract concluded with local agent (including periodic check)
(8) The Presentation slide used for the training
(9) Medical equipment maintenance manual (scope of each staff is shown)
(10) Method of image construction of MRI/CT for each part, text book for equipment maintenance
(11) Number of diagnostic imaging photography
(12) Long term plan of equipment budget
(13) The status of utilization of maintenance data base for each equipment

The item (4) and (5) cover the contents of annual maintenance budget proposal the hospital submits to the Ministry of Health and Sports. In case these two items can not cover the contents of proposal, another document will be required.

9. Soft Component (Technical Assistance) Program Cost Estimation

Total Estimated project cost : 18,808 thousand JPY (Refer to the attached the breakdown of estimated Soft Component Program cost)

10. Obligations of Recipient Country

10-1 Obligations of recipient country for the implementation of the Soft Component (Technical Assistance) Program

・DGH is responsible for the arrangement of attendees' schedule and work shift so that expected attendees such as physicians, nurses, co-medicals (clinical laboratory technicians, radiology technician) the person in charge of medical equipment maintenance, and his maintenance team can join the program.

・ Considering that CMSD procures and maintains medical equipment comprehensively it is necessary that they understand the contents of the program consistently and what was instructed and trained is ingrained in CMSD. Thus, CMSD is responsible to the personnel schedule so that at least 2 staffs can join all sessions.

10-2 Obligations of recipient country for medical equipment maintenance

It is necessary to ensure the budget for maintenance and running cost such as the Annual Maintenance Contract fee and consumable and replacement parts fee so that DGH can practice what was instructed and trained during Soft Component Program. Ministry of Health and Sports is responsible to assign and deploy the medical engineer working only in DGH by the opening of the facility constructed under this grant aid.

Attachment1. The Schedule of the Soft Component (Technical Assistance) Program

Attachment2. The breakdown of estimated Soft Component (Technical Assistance) Program cost

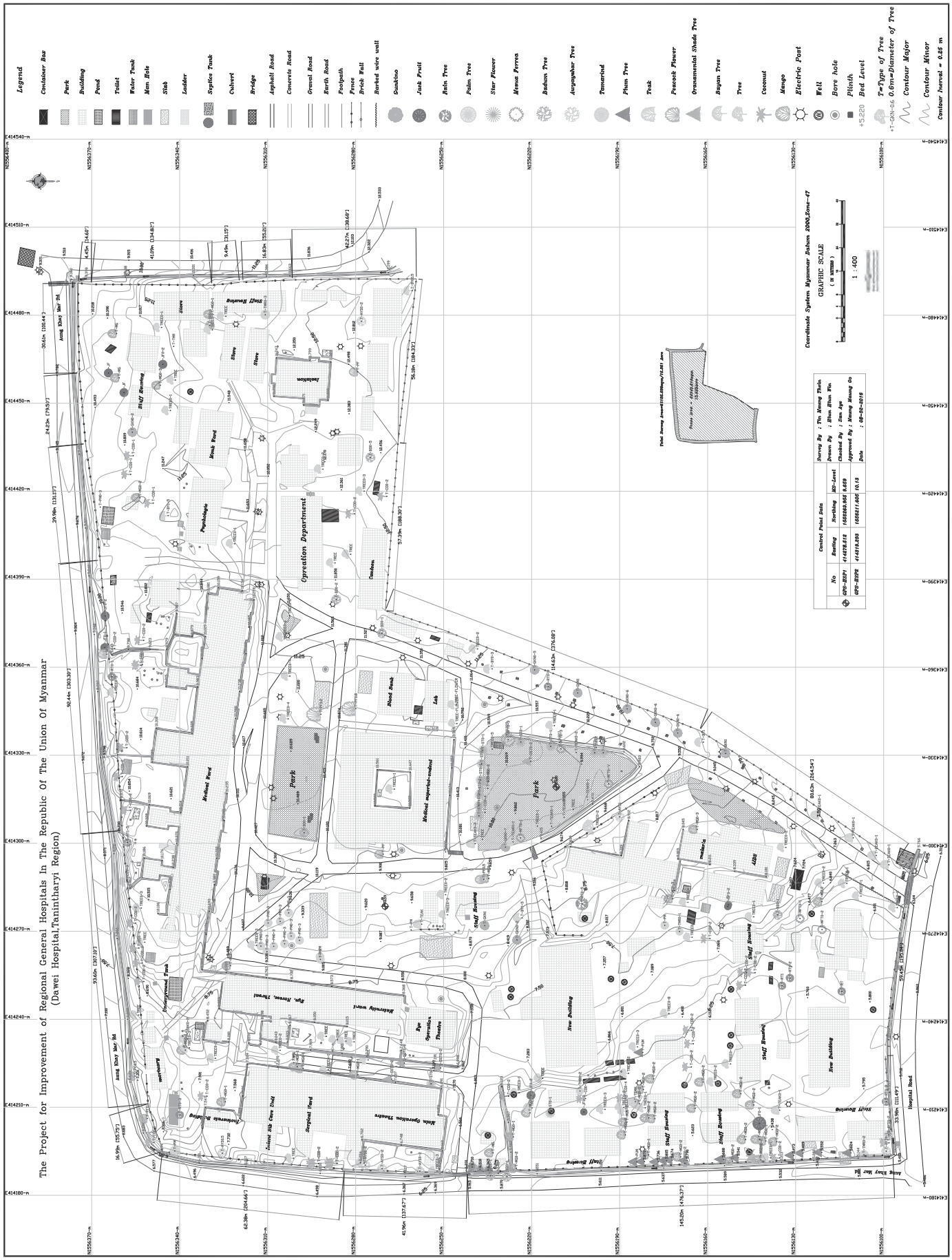
6. Other Relevant Data

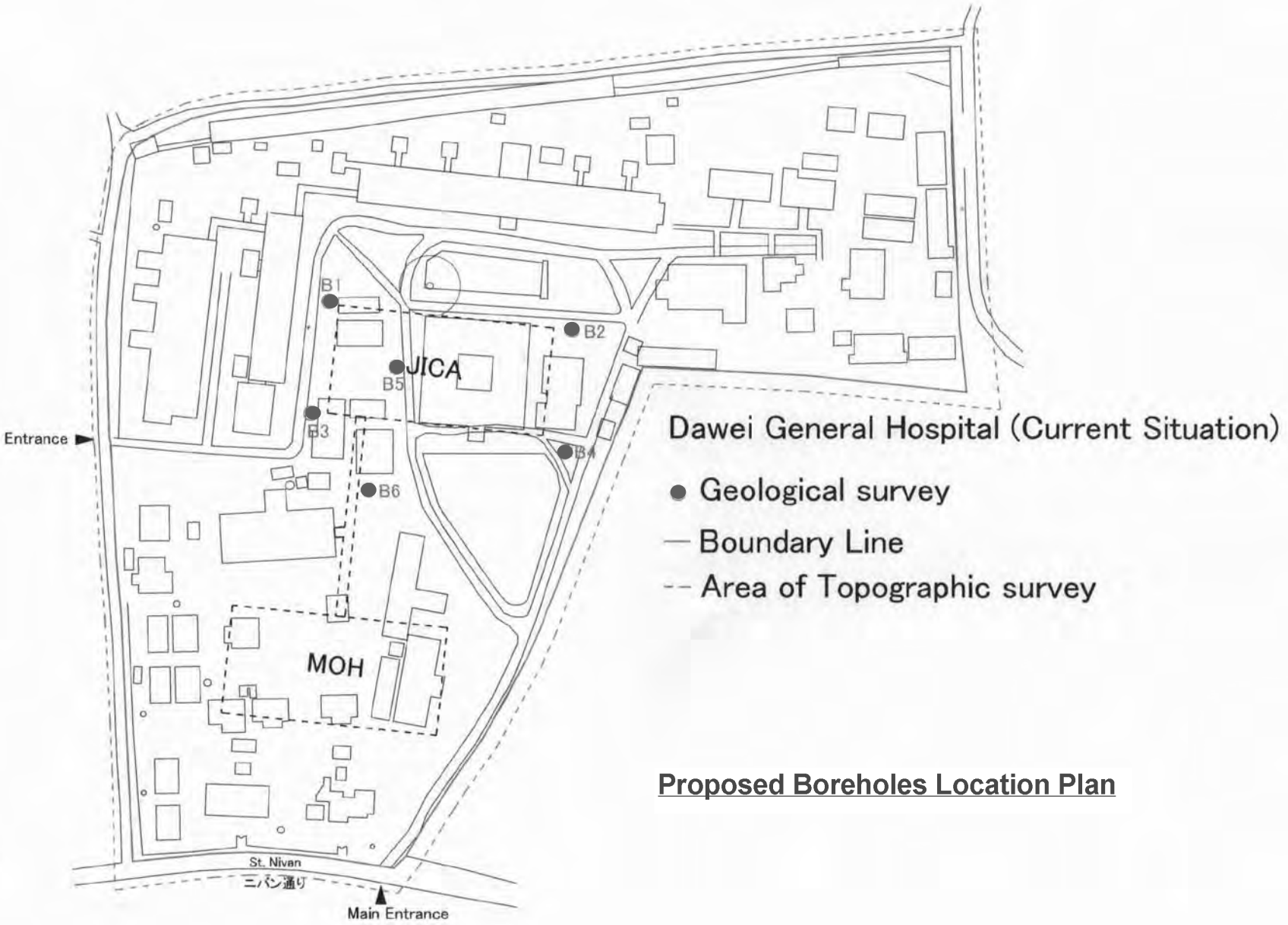
Other Relevant Data

No.	Title	Original / Copy	Issuace
1	Organization set-up of 500-Beds Hospitals	Soft Copy	Department of Medical Services, Ministry of Health and Sports
2	Annual Hospital Statistics Report 2012-13	Soft Copy	Department of Medical Services, Ministry of Health and Sports
3	200 bedded equipment list	Soft Copy	Department of Medical Services, Ministry of Health and Sports
4	Medical Education System in Myanmar	Soft Copy	The Project for Enhancement of Medical Education
16	Hospital Profile, DGH	Soft Copy	Dawei General Hospital
17	5 leading cause diseases of each ward 2012-1023	Soft Copy	Dawei General Hospital
18	DGH ENT morbidity	Soft Copy	Dawei General Hospital
19	Number of referral patients in and out (DGH)	Soft Copy	Dawei General Hospital
20	The number of major and minor operations in 2015 by department	Soft Copy	Dawei General Hospital
21	List of request equipment	Copy	Dawei General Hospital
22	Annual Budget from 2011-12 to 2015-16	Copy	Dawei General Hospital

7. References

7-1 Topographic Survey for Dawei General Hospital





Proposed Boreholes Location Plan

BOREHOLE LOGS

BH-1

BORE HOLE No. **BH - 1**

B O R I N G L O G (FOR DESIGN PARAMETERS CONSIDERATION)

Sheet No. 1 OF 1

PROJECT NAME : Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

LOCATION : In the compound of Dawei General Hospital, Dawei

GROUND LEVEL : Existing Ground Level

COORDINATE : N : 14° 04' 44.4", E : 98°12' 08.7" DEPTH : 30.45 m

BORING EQUIPMENT : TOHO (CD-6) DATE : 27/1/16 ~ 31/1/16

BORING METHOD : Rotary Drilling Method LOGGED BY : Nyi Nyi Htut

ORIENTATION : Vertical

GROUND WATER LEVEL : 6.20 m

CLIENT

Yamashita Sekkei Inc.

SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM D 1586-99) DEPTH GL - (m)	N-Value (Blows / 30cm)	CURVE OF BLOW N-Value (Blows / 30cm) 0 20 40 60 80 100	SAMPLING SAMPLE (Type & No.)	SAMPLING DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%)	SCALE (m)
1	-1.00	1.00	1.00		Reddish brown			Top soil layer, Reddish brown, CLAY.				1.0	9/30		SPT-1	0.45 / 1.0 / 1.45				1
2					Reddish brown	Stiff	Lean CLAY	Stiff, Reddish brown, Low plasticity, Lean CLAY with sand.				2.0	13/30		SPT-2	2.0 / 2.45				2
3	-3.00	3.00	2.00							3.0 ϕ110		3.0	24/30		SPT-3	3.0 / 3.45				3
4					Reddish brown				3.45 28/1/16			4.0	12/30		SPT-4	4.0 / 4.45				4
5												5.0	35/50		UD-1	5.0 / 5.45				5
6					Yellowish brown	Medium dense to dense	Clayey SAND	Medium dense to dense, Yellowish brown mottled light gray, Fine to coarse grained sand, Clayey SAND.			6.20	6.0	13/30		SPT-5	6.0 / 6.45				6
7												7.0			SPT-6	7.0 / 7.45				7
8												8.0	31/30			8.0 / 8.45				8
9	-9.00	9.00	6.00									9.0	19/30		SPT-7	9.0 / 9.45				9
10					Yellowish brown							10.0			SPT-8	10.0 / 10.45				10
11					Pinkish brown	Medium dense to dense	Silty SAND-I	Medium dense to dense, Yellowish, reddish and pinkish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-I.				11.0	20/30			11.0 / 11.45				11
12												12.0	31/30		SPT-9	12.0 / 12.45				12
13					Reddish brown							13.0				13.0 / 13.45				13
14									13.95 29/1/16			14.0	27/30		SPT-10	14.0 / 14.45				14
15	-15.00	15.00	6.00									15.0	20/30		SPT-11	15.0 / 15.45				15
16	-16.50	16.50	1.50		Light gray	Medium dense	Clayey SAND	Medium dense, Light gray mottled reddish brown, Fine to coarse grained sand, Clayey SAND with trace of gravel.				16.0	51/26		SPT-12	16.0 / 16.45				16
17					Light gray	Very dense	Silty SAND-II	Very dense, Light gray, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-II with gravel.				17.0				17.0 / 17.45				17
18	-18.00	18.00	1.50									18.0	48/30		SPT-13	18.0 / 18.45				18
19	-19.50	19.50	1.50		Light gray	Dense	Silty SAND-I	Dense, Light gray mottled yellowish brown, Fine to coarse grained sand, Silty SAND-I with gravel.				19.0	50/15		SPT-14	19.0 / 19.45				19
20					Yellowish brown	Very dense	Silty SAND-II	Very dense, Yellowish brown, Fine to coarse grained sand, Silty SAND-II with gravel.				20.0				20.0 / 20.45				20
21	-21.00	21.00	1.50						21.00			21.0	26/30		SPT-15	21.0 / 21.45				21
22	-22.50	22.50	1.50		Light gray	Medium dense	Silty SAND-I	Medium dense, Light gray mottled yellowish brown, Fine to coarse grained sand, Silty SAND-I with gravel.	30/1/16			22.0	51/17		SPT-16	22.0 / 22.45				22
23												23.0				23.0 / 23.45				23
24												24.0	52/25		SPT-17	24.0 / 24.45				24
25												25.0				25.0 / 25.45				25
26					Light gray	Very dense	Silty SAND with gravel	Very dense, Light gray, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND with gravel.				26.0	51/15		SPT-18	26.0 / 26.45				26
27												27.0	52/26		SPT-19	27.0 / 27.45				27
28												28.0				28.0 / 28.45				28
29								Depth 1.00 ~ 6.00 m - (Residual soil)				29.0	51/13		SPT-20	29.0 / 29.45				29
30	-30.45	30.45	7.95					Depth 6.00 ~ 31.95 m - (Completely weathered GRANITE)	30.45 31/1/16			30.0	51/30		SPT-21	30.0 / 30.45				30

NOTES

Relative density description		Consistency description	
Relative density	SPT N-Value (nos)	Consistency	SPT N-Value (nos)
Very loose	0 - 4	Very soft	under 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very dense	over 50	Very stiff	16 - 30
		Hard	over 30

Sample key

- P-1 Disturbed sample (SPT sample)
- T-1 Undisturbed Sample (Piston sampler)
- D-1 Undisturbed Sample (Denison sampler)
- Rock core sample (Single core tube)
- Rock core sample (Double core tube)
- Rock core sample (Core lost)
- W-1 Water sample

RQD (%)	Term
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Planner structure

Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Discontinuities

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

Remarks

Geo-friends Engineering & construction Co.,Ltd.

Tel : 951-561431, 959-420107757
www.geo-friends.com
service@geo-friends.com

Revision No.	*Rev-0*
Revision Date	*03/03/16*
Site Geologist	*: Nyi Nyi Htut*
Operator	*: Hla Min Htut*
Checked by	*: May Thu*

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-1**
Total Depth : 30.45 m

Coordinate : N 14° 04' 44.4" E 98° 12' 08.7"
Reduced Level : Existing GL
Drill Started : 27.1.2016
Drill Finished : 31.1.2016
Logged By : Nyi Nyi Htut

Page : 1 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 3 m

Depth of Daily Groundwater Level

28.1.2016 - 0.75 m (Evening)
29.1.2016 - 0.80 m (Morning)
29.1.2016 - 0.70 m (Evening)
30.1.2016 - 6.80 m (Morning)
30.1.2016 - 5.60 m (Evening)

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% 2 4 6 8 10	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	0								D - 1 (0 - 1.0 m)		1.00 m		Top soil layered Reddish brown **CLAY**
	1	▼			9/30cm	3	4	5	SPT - 1 (1.00 - 1.45 m)	9	1.00 m	====	Stiff Reddish brown Low plasticity **Lean CLAY** (Residual soil)
	2	▼			13/30cm	5	6	7	SPT - 2 (2.00 - 2.45 m)	13	1.00 m	====	Stiff Yellowish brown mottled reddish brown Low plasticity **Lean CLAY** with sand (Residual soil)
	3	▼			24/30cm	8	11	13	SPT - 3 (3.00 - 3.45 m)	24	2.00 m	==...	Medium dense Reddish brown mottled yellowish brown Low plasticity **Clayey SAND** (Residual soil)
	4	▼			12/30cm	3	5	7	SPT - 4 (4.00 - 4.45 m)	12		==...	
	5	▨			Rec: 35/50cm				UD - 1 (5.00 - 5.50 m)		1.00 m	==...	Yellowish brown mottled reddish brown sp gray Fine to coarse grained **Clayey SAND** (Residual soil) UD-1 (Cuu=46.63, ϕuu=33.00, Pc=219.14, Cc=0.124)
	6	▼			13/30cm	5	6	7	SPT - 5 (6.00 - 6.45 m)	13	1.50 m	==...	Medium dense Light gray mottled yellowish brown Fine to coarse grained **Clayey SAND** (Completely weathered GRANITE)
	7	▼			31/30cm	7	15	16	SPT - 6 (7.50 - 7.95 m)	31	1.50 m	xx...	Dense Yellowish brown mottled reddish brown spotted light gray Fine to coarse grained **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	8	▼			19/30cm	7	9	10	SPT- 7 (9.00 - 9.45 m)	19		xx...	Medium dense Yellowish brown mottled gray Fine to medium grained **Silty SAND** (Completely weathered GRANITE)
	9												
	10												

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-1**
Total Depth : 30.45 m

Coordinate : N 14° 04' 44.4"
E 98° 12' 08.7"
Reduced Level : Existing GL
Drill Started : 27.1.2016
Drill Finished : 31.1.2016
Logged By : Nyi Nyi Htut

Page : 2 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 3 m

Depth of Daily Groundwater Level
31.1.2016 - 6.20 m (Morning)
31.1.2016 - 6.40 m (Evening)

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% 2 4 6 8 10	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	10										1.50 m	xx...	
	11	▼			20/30cm	6	9	11	SPT - 8 (10.50 - 10.95 m)	20	1.50 m	xx...	Medium dense Pinkish brown mottled gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	12												
	13	▼			31/30cm	15	15	16	SPT - 9 (12.00 - 12.45 m)	31	1.50 m	xx...	Dense Reddish brown mottled gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	14	▼			27/30cm	7	11	16	SPT - 10 (13.50 - 13.95 m)	27	1.50 m	xx...	Medium dense Reddish brown mottled gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	15												
	16	▼			20/30cm	4	8	12	SPT - 11 (15.00 - 15.45 m)	20	1.50 m	==	Medium dense Light gray mottled reddish brown Subrounded to subangular **Clayey SAND** with gravel (Completely weathered GRANITE)
	17	▼			51/26cm	21	25	26/11cm	SPT - 12 (16.50 - 16.91 m)	51	1.50 m	xx...	Very dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	18												
	19	▼			48/30cm	25/3cm	32	16	SPT - 13 (18.00 - 18.42 m)	48	1.50 m	xx...	Dense Light gray mottled yellowish brown Fine to coarse graine Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	20	▼			50/15cm	22	50	-	SPT - 14 (19.50 - 19.80 m)	50		xx...	

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-1**
Total Depth : 30.45 m

Coordinate : N 14° 04' 44.4"
E 98° 12' 08.7"
Reduced Level : Existing GL
Drill Started : 27.1.2016
Drill Finished : 31.1.2016
Logged By : Nyi Nyi Htut

Page : 3 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 3 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION (X 10%, 2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	20												Dense Yellowish brown mottled gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	21										1.50 m		
		▼			26/30cm	15	11	16	SPT -15 (21.00 - 21.45 m)	26			Medium dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	22										1.50 m		
		▼			51/17cm	22	48	3/ 2cm	SPT - 16 (22.50 - 22.82 m)	51			Very dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	23												
	24												
		▼			52/25cm	24	42	10/ 10cm	SPT - 17 (24.00 - 24.40 m)	52			
	25												
		▼			51/15cm	25	51	-	SPT - 18 (25.50 - 25.80 m)	51			
	26												
	27												
		▼			52/26cm	20	41	11/ 11cm	SPT -19 (27.00 - 27.41 m)	52			
	28												
		▼			51/13cm	24	51/ 13cm	-	SPT -20 (28.50 - 28.78 m)	51			
	29												
	30												

R.Q.D
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25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-1**
Total Depth : 30.45 m

Coordinate : N 14° 04' 44.4"
E 98° 12' 08.7"
Reduced Level : Existing GL
Drill Started : 27.1.2016
Drill Finished : 31.1.2016
Logged By : Nyi Nyi Htut

Page : 4 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 3 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION (X 10%, 2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	30	▼			51/30cm	23	24	27	SPT - 21 (30.00 - 30.45 m)	51	7.95 m	xx... xx... xx... xx... xx...	Very dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	31												
	32												
	33												
	34												
	35												
	36												
	37												
	38												
	39												
	40												

Borehole terminated at 30.45 m BGL.

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

BH-2

BORE HOLE No. **BH - 2**

B O R I N G L O G (FOR DESIGN PARAMETERS CONSIDERATION)

Sheet No. 1 OF 2

PROJECT NAME : Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

LOCATION : In the compound of Dawei General Hospital, Dawei

GROUND LEVEL : Existing Ground Level

COORDINATE : N : 14° 04' 43.8", E : 98°12' 11.9" DEPTH : 31.95 m

BORING EQUIPMENT : YWE (CD-1) DATE : 28/1/16 ~ 31/1/16

BORING METHOD : Rotary Drilling Method LOGGED BY : Zaw Htet

ORIENTATION : Vertical

GROUND WATER LEVEL : 6.20 m

CLIENT: Yamashita Sekkei Inc.

SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)
1					Reddish brown	Very loose	Gravelly SAND	Top soil layer, very loose, Reddish brown, Gravelly SAND (Back filled soil).			
2	-2.00	2.00	2.00								
3					Reddish brown	Medium dense to dense	SAND	Medium dense to dense, Reddish brown, Fine to coarse grained sand, SAND with traces of gravel (Residual soil).		3.0 ϕ110	
4											
5	-5.00	5.00	3.00								
6					Light gray						6.20
7											
8					Reddish brown						
9											
10											
11						Medium dense to dense	Silty SAND-I	Medium dense to dense, Light gray and reddish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-I with trace of gravel.	10.50 28/1/16		
12								GL - 10.5 ~ 12.0 m, Silty SAND-I with gravel.			
13											
14											
15					Light gray						
16											
17											
18									18.00 29/1/16		
19	-19.50	19.50	14.50								
20					Light gray	Dense to very dense	Silty SAND with gravel	Dense to very dense, Light gray, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND with gravel.			
21											
22											
23											
24											
25											
26											
27											
28											
29									28.50 30/1/16		
30											

STANDARD PENETRATION TEST
TEST METHOD (ASTM D 1586-99)

DEPTH GL - (m)	N-Value (Blows / 30cm)
1.0	1/30
2.0	12/30
3.0	38/30
4.0	12/30
5.0	13/30
6.0	11/30
7.0	
8.0	16/30
9.0	23/30
10.0	
11.0	13/30
12.0	37/30
13.0	
14.0	15/30
15.0	23/30
16.0	
17.0	17/30
18.0	49/30
19.0	
20.0	55/19
21.0	53/9
22.0	
23.0	50/4
24.0	52/22
25.0	
26.0	50/25
27.0	36/30
28.0	
29.0	54/25
30.0	50/19

CURVE OF BLOW ●
N-Value (Blows / 30cm)
0 20 40 60 80 100

SAMPLING

SAMPLE (Type & No.)	DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%)
	0.45			
SPT-1	1.0			
	1.45			
SPT-2	2.0			
	2.45			
SPT-3	3.0			
	3.45			
SPT-4	4.0			
	4.45			
SPT-5	5.0			
	5.45			
SPT-6	6.0			
	6.45			
	7.0			
SPT-7	7.45			
	8.0			
	8.45			
SPT-8	9.0			
	9.45			
	10.0			
SPT-9	10.45			
	11.0			
	11.45			
SPT-10	12.0			
	12.45			
	13.0			
SPT-11	13.45			
	14.0			
	14.45			
SPT-12	15.0			
	15.45			
	16.0			
SPT-13	16.45			
	17.0			
	17.45			
SPT-14	18.0			
	18.45			
	19.0			
SPT-15	19.45			
	20.0			
	20.45			
SPT-16	21.0			
	21.45			
	22.0			
SPT-17	22.45			
	23.0			
	23.45			
SPT-18	24.0			
	24.45			
	25.0			
SPT-19	25.45			
	26.0			
	26.45			
SPT-20	27.0			
	27.45			
	28.0			
SPT-21	28.45			
	29.0			
	29.45			
SPT-22	30.0			
	30.45			

NOTES

Relative density description		Consistency description	
Relative density	SPT N-Value (mean)	Consistency	SPT N-Value (mean)
Very loose	0 - 4	Very soft	under 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very dense	over 50	Very stiff	16 - 30
		Hard	over 30

Sample key

- P-1 Disturbed sample (SPT sample)
- T-1 Undisturbed Sample (Piston sampler)
- D-1 Undisturbed Sample (Denison sampler)
- Rock core sample (Single core tube)
- Rock core sample (Double core tube)
- Rock core sample (Core lost)
- W-1 Water sample

RQD (%)	Term
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Planner structure

Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Discontinuities

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

Remarks

Geo-friends Engineering & construction Co.,Ltd.
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service@geo-friends.com

Revision No.	Rev-0
Revision Date	03/03/16
Site Geologist	Zaw Htet
Operator	Win Shwe
Checked by	May Thu

BORE HOLE No. **BH - 2**

B O R I N G L O G (FOR DESIGN PARAMETERS CONSIDERATION)

Sheet No. 2 OF 2

PROJECT NAME : Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

LOCATION : In the compound of Dawei General Hospital, Dawei

GROUND LEVEL : Existing Ground Level

COORDINATE : N : 14° 04' 43.8", E : 98°12' 11.9" DEPTH : 31.95 m

BORING EQUIPMENT : YWE (CD-1) DATE : 28/1/16 ~ 31/1/16

BORING METHOD : Rotary Drilling Method LOGGED BY : Zaw Htet

ORIENTATION : Vertical

GROUND WATER LEVEL : 6.20 m

CLIENT

Yamashita Sekkei Inc.

SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM D 1586-99) DEPTH GL - (m)	N-Value (Blows / 30cm)	CURVE OF BLOW / N-Value (Blows / 30cm) 0 20 40 60 80 100	SAMPLE (Type & No.)	SAMPLING DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%)	SCALE (m)
31					Light gray	Dense to very dense	Silty SAND with gravel	Dense to very dense, Light gray, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND with gravel.				31.0	53/6		SPT-23	30.45 / 31.0 / 31.45				31
32	-31.50	31.50	12.00																	
	-31.95	31.95	0.45		Light gray	Hard	Gravelly Lean CLAY	Hard, Light gray mottled reddish brown, Low plasticity, Gravelly Lean CLAY.	31.95 / 31/1/16			32.0				32.0 / 32.45				32
33												33.0				33.0 / 33.45				33
34												34.0				34.0 / 34.45				34
35												35.0				35.0 / 35.45				35
36								Depth 2.00 ~ 9.00 m - (Residual soil)				36.0				36.0 / 36.45				36
37								Depth 9.00 ~ 31.95 m - (Completely weathered GRANITE)				37.0				37.0 / 37.45				37
38												38.0				38.0 / 38.45				38
39												39.0				39.0 / 39.45				39
40												40.0				40.0 / 40.45				40
41												41.0				41.0 / 41.45				41
42												42.0				42.0 / 42.45				42
43												43.0				43.0 / 43.45				43
44												44.0				44.0 / 44.45				44
45												45.0				45.0 / 45.45				45
46												46.0				46.0 / 46.45				46
47												47.0				47.0 / 47.45				47
48												48.0				48.0 / 48.45				48
49												49.0				49.0 / 49.45				49
50												50.0				50.0 / 50.45				50
51												51.0				51.0 / 51.45				51
52												52.0				52.0 / 52.45				52
53												53.0				53.0 / 53.45				53
54												54.0				54.0 / 54.45				54
55												55.0				55.0 / 55.45				55
56												56.0				56.0 / 56.45				56
57												57.0				57.0 / 57.45				57
58												58.0				58.0 / 58.45				58
59												59.0				59.0 / 59.45				59
60												60.0				60.0 / 60.45				60

NOTES

Relative density description		Consistency description	
Relative density	SPT N-Value (mean)	Consistency	SPT N-Value (mean)
Very loose	0 - 4	Very soft	under 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very dense	over 50	Very stiff	16 - 30
		Hard	over 30

Sample key

- P-1 Disturbed sample (SPT sample)
- T-1 Undisturbed Sample (Piston sampler)
- D-1 Undisturbed Sample (Denison sampler)
- Rock core sample (Single core tube)
- Rock core sample (Double core tube)
- Rock core sample (Core lost)
- W-1 Water sample

RQD (%)	Term
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Planner structure

Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Discontinuities

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

Remarks

Geo-friends Engineering & construction Co.,Ltd.

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service@geo-friends.com

Revision No.	Rev-0
Revision Date	03/03/16
Site Geologist : Zaw Htet	
Operator : Win Shwe	
Checked by : May Thu	

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-2**
Total Depth : 31.67 m

Co-ordinate : N 14° 04' 43.8″
E 98° 12' 11.9″
Reduced Level : Existing ground level
Drill Started : 28.1.2016
Drill Finished : 31.1.2016
Logged By : Zaw Htet

Page : 1 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 3 m

Depth of Daily Groundwater Level

28.1.2016 - 2.20 m (Evening)
29.1.2016 - 5.41 m (Morning)
29.1.2016 - 3.85 m (Evening)
30.1.2016 - 6.30 m (Morning)
30.1.2016 - 3.93 m (Evening)

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	0								D - 1 (0.00 - 1.50 m)		1.00 m		Top soil layer **Back Filled soil**
	2	▼			1/30cm	Ham wt;	→	1	SPT - 1 (1.00 - 1.45 m)	1	1.00 m	.....	Very loose Reddish brown Fine to medium grained Subrounded to subangular **SAND** with gravel **(Back Filled soil)**
	3	▼			12/30cm	5	6	6	SPT - 2 (2.00 - 2.45 m)	12	1.00 m	.....	Medium dense Reddish brown Fine to coarse grained Subrounded to subangular **SAND** with traces of gravel (Residual soil)
	4	▼			38/30cm	4	15	23	SPT- 3 (3.00 - 3.45 m)	38	1.00 m	.....	Dense Reddish brown Fine to coarse grained Subrounded to subangular **SAND** with traces of gravel (Residual soil)
	5	▼			12/30cm	5	6	6	SPT- 4 (4.0 - 4.45 m)	12	1.00 m	xx.....	Medium dense Reddish brown Fine to coarse grained Subrounded to subangular **Silty SAND** (Residual soil)
	6	▼			13/30cm	5	6	7	SPT - 5 (5.00 - 5.45 m)	13	1.00 m	xx.....	Medium dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** (Residual soil)
	7	▼			11/30cm	5	5	6	SPT - 6 (6.00 - 6.45 m)	11	1.50 m	xx.....	Medium dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Residual soil)
	9	▼			16/30cm	5	7	9	SPT - 7 (7.50 - 7.95 m)	16	1.50 m	xx.....	Medium dense Reddish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Residual soil)
	10	▼			23/30cm	5	9	14	SPT - 8 (9.00 - 9.45 m)	23		xx.....	Medium dense Yellowish gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-2**
Total Depth : 31.67 m

Co-ordinate : N 14° 04' 43.8″
E 98° 12' 11.9″
Reduced Level : Existing ground level
Drill Started : 28.1.2016
Drill Finished : 31.1.2016
Logged By : Zaw Htet

Page : 2 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 3 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	Depth of Daily Groundwater Level / Description
	10										1.50 m	xx.....	
	11	▼			13/30cm	10	6	7	SPT - 9 (10.50 - 10.95 m)	13	1.50 m	xx.....	Medium dense Reddish brown mottled light gray Fine to coarse grained **Silty SAND** with gravel (Completely weathered GRANITE)
	12												
	13	▼			37/30cm	6	12	25	SPT - 10 (12.00 - 12.45 m)	37	1.50 m	xx.....	Dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	14	▼			15/30cm	6	7	8	SPT - 11 (13.50 - 13.95 m)	15	1.50 m	xx.....	Medium dense Light gray mottledy yellowish brown Fine to coarse grained **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	15												
	16	▼			23/30cm	7	8	15	SPT- 12 (15.00 - 15.45 m)	23	1.50 m	xx.....	Medium dense Light grey Fine to coarse grained **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	17	▼			17/30cm	9	9	8	SPT - 13 (16.50 - 16.95 m)	17	1.50 m	xx.....	Medium dense Light grey Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	18												
	19	▼			49/30cm	23	24	25	SPT - 14 (18.00 - 18.45 m)	49	1.50 m	xx.....	Dense Light grey Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	20	▼			55/19cm	25/ 12cm	47	8/ 4cm	SPT - 15 (19.50 - 19.81 m)	55		xx.....	

Depth of Daily Groundwater Level

31.1.2016 - 6.24 m (Morning)
31.1.2016 - 6.30 m (Evening)

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<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
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5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
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Average Length of Core Pieces
1 = Average length of core pieces >50cm
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Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-2**
Total Depth : 31.67 m

Co-ordinate : N 14° 04' 43.8″
E 98° 12' 11.9″
Reduced Level : Existing ground level
Drill Started : 28.1.2016
Drill Finished : 31.1.2016
Logged By : Zaw Htet

Page : 3 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 3 m

Elevation (MSL) / Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION (X 10%)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
20											xx.....	Very dense Light grey Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
21	▼			53/9cm	25	53/9cm	-	SPT - 16 (21.00 - 21.24 m)	53			
22												
23	▼			50/4cm	25/6cm	50/4cm	-	SPT - 17 (22.50 - 22.60 m)	50			
24												
25	▼			52/22cm	25/13cm	38	14/7cm	SPT - 18 (24.00 - 24.35 m)	52	6.00 m		
26	▼			50/25cm	25	32	18/10cm	SPT - 19 (25.50 - 25.90 m)	50	1.50 m		Very dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
27												
28	▼			36/30cm	14	16	20	SPT - 20 (27.00 - 27.45 m)	36	1.50 m		Dense Light grey Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
29	▼			54/25cm	25/9cm	35	19/10cm	SPT - 21 (28.50 - 28.84 m)	54	1.50 m		Very dense Light grey Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
30												

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5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-2**
Total Depth : 31.67 m

Co-ordinate : N 14° 04' 43.8″
E 98° 12' 11.9″
Reduced Level : Existing ground level
Drill Started : 28.1.2016
Drill Finished : 31.1.2016
Logged By : Zaw Htet

Page : 4 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 3 m

Elevation (MSL) / Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
30				50/19cm	6	30	20/4cm	SPT - 22 (30.00 - 30.34 m)	50	1.50 m	xx...	Very dense Light grey Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
31												
32				53/6cm	25/11cm	53/6cm	-	SPT - 23 (31.50 - 31.67 m)	53	0.17 m	oo==	Hard Light gray mottled reddish brown Low plasticity **Gravelly Lean CLAY** (Completely weathered GRANITE)
33												**Borehole terminated at 31.67 m BGL.**
34												
35												
36												
37												
38												
39												
40												

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25-50 = Poor Rock
50-75% = Fair Rock
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3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

BH-3

BORE HOLE No. **BH - 3**

B O R I N G L O G (FOR DESIGN PARAMETERS CONSIDERATION)

Sheet No. 1 OF 1

PROJECT NAME : Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar
BORING EQUIPMENT : TOHO (CD-6) DATE : 1/2/16 ~ 5/2/16
LOCATION : In the compound of Dawei General Hospital, Dawei
BORING METHOD : Rotary Drilling Method LOGGED BY : Nyi Nyi Htut
GROUND LEVEL : Existing Ground Level
ORIENTATION : Vertical
CLIENT
COORDINATE : N : 14° 04' 42.4", E : 98°12' 08.2" DEPTH : 30.45 m
GROUND WATER LEVEL : 3.90 m
Yamashita Sekkei Inc.

SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION
1	-1.00	1.00	1.00		Reddish brown			Top soil layer, Reddish brown, CLAY.
2	-2.00	2.00	1.00		Reddish brown	Stiff	Lean CLAY	Stiff, Reddish brown, Low plasticity, Lean CLAY.
3								
4								
5								
6					Reddish brown			
7						Medium dense to dense	Clayey SAND	Medium dense to dense, Reddish brown and Light gray mottled yellowish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Clayey SAND with trace of gravel.
8								
9								
10					Light gray			
11								
12								
13	-13.50	13.50	11.50					
14								
15					Yellowish brown	Medium dense to dense	Silty SAND-I	Medium dense to dense, Yellowish brown mottled gray, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-I with trace of gravel.
16	-16.50	16.50	3.00					
17					Reddish brown	Very dense	Silty SAND-II	Very dense, Reddish brown mottled gray, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-II with trace of gravel.
18	-18.00	18.00	1.50					
19	-19.50	19.50	1.50		Light gray	Dense	Clayey SAND	Dense, Light gray, Fine to coarse grained sand, Sub-rounded to sub-angular, Clayey SAND.
20								
21					Light gray			
22								
23					Grayish pink			
24								
25					Yellowish brown	Very dense	Silty SAND with gravel	Very dense, Light gray mottled yellowish brown and grayish pink, Fine to medium grained sand, Sub-rounded to sub-angular, Silty SAND with gravel.
26								
27								
28					Light gray			
29								Depth 1.00 ~ 6.00 m - (Residual soil)
30	-30.00	30.00	10.50					Depth 6.00 ~ 30.45 m - (Completely weathered GRANITE)
	-30.45	30.45	0.45		Gray	Hard	Gravelly Lean CLAY	Hard, Gray, Low plasticity, Gravelly Lean CLAY.

DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)
3.45		
28/1/16		▽ 3.90
	15.0	
	ϕ110	
18.45		
2/2/16		
21.00		
3/2/16		
22.50		
4/2/16		
30.45		
5/2/16		

STANDARD PENETRATION TEST
TEST METHOD (ASTM D 1586-99)

DEPTH GL - (m)	N-Value (Blows / 30cm)
1.0	11/30
2.0	16/30
3.0	30/50
4.0	17/30
5.0	40/45
6.0	15/30
7.0	
8.0	20/30
9.0	34/30
10.0	
11.0	36/30
12.0	40/30
13.0	
14.0	26/30
15.0	48/30
16.0	
17.0	51/23
18.0	40/30
19.0	
20.0	51/19
21.0	51/20
22.0	
23.0	52/9
24.0	51/6
25.0	
26.0	52/10
27.0	50/6
28.0	
29.0	51/12
30.0	52/10

CURVE OF BLOW ●
N-Value (Blows / 30cm)
0 20 40 60 80 100

SAMPLING

SAMPLE (Type & No.)	DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%)	SCALE (m)
	0.45				
SPT-1	1.0				1
	1.45				
SPT-2	2.0				2
	2.45				
UD-1	3.0				3
	3.45				
SPT-3	4.0				4
	4.45				
UD-2	5.0				5
	5.45				
SPT-4	6.0				6
	6.45				
	7.0				7
SPT-5	7.45				
	8.0				8
	8.45				
SPT-6	9.0				9
	9.45				
	10.0				10
SPT-7	10.45				
	11.0				11
	11.45				
SPT-8	12.0				12
	12.45				
	13.0				13
SPT-9	13.45				
	14.0				14
	14.45				
SPT-10	15.0				15
	15.45				
	16.0				16
SPT-11	16.45				
	17.0				17
	17.45				
SPT-12	18.0				18
	18.45				
	19.0				19
SPT-13	19.45				
	20.0				20
	20.45				
SPT-14	21.0				21
	21.45				
	22.0				22
SPT-15	22.45				
	23.0				23
	23.45				
SPT-16	24.0				24
	24.45				
	25.0				25
SPT-17	25.45				
	26.0				26
	26.45				
SPT-18	27.0				27
	27.45				
	28.0				28
SPT-19	28.45				
	29.0				29
	29.45				
SPT-20	30.0				30
	30.45				

NOTES

Relative density description		Consistency description	
Relative density	SPT N-Value (mean)	Consistency	SPT N-Value (mean)
Very loose	0 - 4	Very soft	under 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very dense	over 50	Very stiff	16 - 30
		Hard	over 30

Sample key
- P-1 Disturbed sample (SPT sample)
- T-1 Undisturbed Sample (Piston sampler)
- D-1 Undisturbed Sample (Denison sampler)
- Rock core sample (Single core tube)
- Rock core sample (Double core tube)
- Rock core sample (Core lost)
- W-1 Water sample

RQD (%)	Term
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Planner structure

Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Discontinuities

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

Remarks

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Revision No.	Rev-0
Revision Date	03/03/16
Site Geologist	: Nyi Nyi Htut
Operator	: Hla Min Htut
Checked by	: May Thu

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-3**
Total Depth : 30.21 m

Co-ordinate : N 14° 04' 42.4″ E 98° 12' 08.2″
Reduced Level : Existing ground level
Drill Started : 1.2.2016
Drill Finished : 5.2.2016
Logged By : Nyi Nyi Htut

Page : 1 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 15 m

Depth of Daily Groundwater Level

2.2.2016 - 3.5 m (Evening)
3.2.2016 - 3.7 m (Morning)
3.2.2016 - 3.8 m (Evening)
4.2.2016 - 3.6 m (Morning)
4.2.2016 - 4.1 m (Evening)

Elevation (MSL) / Depth (m)	In-situ Test / Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
0							D - 1 (0.00 - 1.50 m)		1.00 m		Top soil layer Reddish brown **CLAY** (Lateratic soil)
2			11/30cm	3	5	6	SPT - 1 (1.00 - 1.45 m)	11	1.00 m	====	Stiff Reddish brown mottled yellowish brown Low plasticity **Lean CLAY** (Residual soil)
3			16/30cm	6	10	6	SPT - 2 (2.00 - 2.45 m)	16	1.00 m	==...	Medium dense Reddish brown Fine to coarse grained Subrounded to subangular **Clayey SAND** with traces of gravel (Residual soil)
4			Rec: 30/50cm				UD - 1 (3.00 - 3.50 m)		1.00 m	==...	Reddish brown mottled gray Low plasticity **Clayey SAND** with traces of gravel (Residual soil) UD-1 (UCS=259.6, Pc=225.91, Cc=0.091)
5			17/30cm	7	8	9	SPT- 3 (4.00 - 4.45 m)	17	1.00 m	==...	Medium dense Yellowish brown **Clayey SAND** with traces of gravel (Residual soil)
6			Rec: 40/45cm				UD - 2 (5.00 - 5.45 m)		1.00 m	==...	Light gray Fine to medium grained Low plasticity **Clayey SAND** with traces of gravel (Resid soil) UD-2 (UCS=404.26)
7			15/30cm	5	7	8	SPT - 4 (6.00 - 6.45 m)	15	1.50 m	==...	Medium dense Light gray mottled yellowish brown Fine to coarse grained **Clayey SAND** with traces of gravel (Completely weathered GRANITE)
8			20/30cm	7	11	9	SPT - 5 (7.50 - 7.95 m)	20	1.50 m	==...	Medium dense Reddish brown mottled gray Fine to coarse grained Subrounded to subangular **Clayey SAND** with traces of gravel (Completely weathered GRANITE)
9			34/30cm	10	15	19	SPT - 6 (9.00 - 9.45 m)	34		xx...	Dense Light gray mottled yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
10											

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25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
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Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
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Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-3**
Total Depth : 30.21 m

Co-ordinate : N 14° 04' 42.4″ E 98° 12' 08.2″
Reduced Level : Existing ground level
Drill Started : 1.2.2016
Drill Finished : 5.2.2016
Logged By : Nyi Nyi Htut

Page : 2 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 15 m

Depth of Daily Groundwater Level

5.2.2016 - 3.9 m (Morning)
5.2.2016 - 5.1 m (Evening)

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	10											xx...	
	11	▼			36/30cm	15	16	20	SPT - 7 (10.50 - 10.95 m)	36	3.00 m	xx.....	Dense Light gray mottled yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	12	▼			40/30cm	7	16	24	SPT - 8 (12.00 - 12.45 m)	40	1.50 m	==...	Dense Light gray mottled yellowish brown Low plasticity **Clayey SAND** (Completely weathered GRANITE)
	13	▼			26/30cm	8	12	14	SPT - 9 (13.50 - 13.95 m)	26	1.50 m	xx.....	Medium dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	14	▼			48/30cm	9	23	25	SPT- 10 (15.00 - 15.45 m)	48	1.50 m	xx.....	Dense Yellowish brown mottled gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	15	▼			51/23cm	23	33	18/ 8cm	SPT - 11 (16.50 - 16.88 m)	51	1.50 m	xx.....	Very dense Reddish brown mottled gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	16	▼			40/30cm	16	18	22	SPT - 12 (18.00 - 18.45 m)	40	1.50 m	==....	Dense Light grey Fine to coarse grained Subrounded to subangular **Clayey SAND** with traces of gravel (Completely weathered GRANITE)
	17	▼			51/19cm	23	40	11/ 4cm	SPT - 13 (19.50 - 19.84 m)	51		xx.....	
	18											xx.....	
	19											==....	
	20											xx.....	

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

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E 98° 12' 08.2″
Reduced Level : Existing ground level
Drill Started : 1.2.2016
Drill Finished : 5.2.2016
Logged By : Nyi Nyi Htut

Page : 3 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 15 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	20											xx...	
	21											xx...	Very dense Light gray mottled yellowish brown Fine to coarse grained Subrounded to subangular shaped **Silty SAND** with traces of gravel (Completely weathered GRANITE)
		▼			51/20cm	25/ 8cm	39	12/ 5cm	SPT - 14 (21.00 - 21.28 m)	51		xx...	
	22										3.00 m	xx...	
		▼			52/9cm	25/ 8cm	52/ 9cm	-	SPT - 15 (22.50 - 22.67 m)	52		xx...	Very dense Grayish pink Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	23											xx...	
	24										1.50 m	xx...	
		▼			51/6cm	25/ 11cm	51/ 6cm	-	SPT - 16 (24.00 - 24.17 m)	51		xx...	Very dense Yellowish brown mottled gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	25											xx...	
		▼			52/10cm	25/ 8cm	52/ 10cm	-	SPT - 17 (25.50 - 25.68 m)	52		xx...	
	26											xx...	
	27										3.00 m	xx...	
		▼			50/6cm	25/ 9cm	50/ 6cm	-	SPT - 18 (27.00 - 27.15 m)	50		xx...	Very dense Light gray mottled yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	28											xx...	
		▼			51/12cm	25/ 10cm	51/ 12cm	-	SPT - 19 (28.50 - 28.72 m)	51		xx...	
	29											xx...	
	30										3.00 m	xx...	

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Total Depth : 30.21 m

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E 98° 12' 08.2″
Reduced Level : Existing ground level
Drill Started : 1.2.2016
Drill Finished : 5.2.2016
Logged By : Nyi Nyi Htut

Page : 4 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 15 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION (X 10%)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	30	▼			52/10cm	25/ 11cm	52/ 10cm	-	SPT - 20 (30.00 - 30.21 m)	52	0.21 m	==00	Very dense Gray Fine to coarse grained Subrounded to subangular **Clayey GARVEL** with sand (Completely weathered GRANITE)
	31												
	32												**Borehole terminated at 30.21 m BGL.**
	33												
	34												
	35												
	36												
	37												
	38												
	39												
	40												

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Symbol
Core Loss
SPT
UD

BH-4

BORE HOLE No. **BH - 4**

B O R I N G L O G (FOR DESIGN PARAMETERS CONSIDERATION)

Sheet No. 1 OF 1

PROJECT NAME : Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

LOCATION : In the compound of Dawei General Hospital, Dawei

GROUND LEVEL : Existing Ground Level

COORDINATE : N : 14° 04' 44.2", E : 98°12' 11.6" DEPTH : 30.45 m

BORING EQUIPMENT : YWE (CD-1) DATE : 1/2/16 ~ 6/2/16

BORING METHOD : Rotary Drilling Method LOGGED BY : Zaw Htet

ORIENTATION : Vertical

GROUND WATER LEVEL : 5.40 m

CLIENT: Yamashita Sekkei Inc.

SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM D 1586-99) DEPTH GL - (m)	N-Value (Blows / 30cm)	SAMPLE (Type & No.)	SAMPLING DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%)	SCALE (m)
1	-1.00	1.00	1.00					Top soil layer.				1.0	11/30	SPT-1	0.45 - 1.0				1
2					Reddish brown	Medium dense	Clayey SAND	Medium dense, Reddish and yellowish brown, Low plasticity, Clayey SAND.				2.0	13/30	SPT-2	1.45 - 2.0				2
3												3.0	25/30	UD-1	2.45 - 3.0				3
4					Yellowish brown				4.00 1/2/16			4.0	14/30	SPT-3	3.45 - 4.0				4
5	-5.00	5.00	4.00									5.0	7/30	SPT-4	4.45 - 5.0				5
6	-6.00	6.00	1.00		Light gray	Loose	Silty SAND-I	Loose, Light gray mottled yellowish brown, Fine to medium grained sand, Silty SAND-I.			5.40	6.0	17/30	SPT-5	5.45 - 6.0				6
7	-7.50	7.50	1.50		Light gray	Medium dense	Clayey SAND	Medium dense, Light gray mottled yellowish brown, Low plasticity, Clayey SAND.				7.0	13/30	SPT-6	6.45 - 7.0				7
8												8.0			7.45 - 8.0				8
9					Reddish brown	Medium dense	Silty SAND-I	Medium dense, Reddish brown mottled yellowish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-I with gravel.				9.0	24/30	SPT-7	8.45 - 9.0				9
10	-10.50	10.50	3.00									10.0		SPT-8	9.45 - 10.0				10
11					Reddish brown	Medium dense	Clayey SAND	Medium dense, Reddish brown mottled light gray, Low plasticity, Clayey SAND with trace of gravel.				11.0	13/30		10.45 - 11.0				11
12	-12.00	12.00	1.50									12.0	35/30	SPT-9	11.45 - 12.0				12
13	-13.50	13.50	1.50		Yellowish brown	Dense	Silty SAND-I	Dense, Yellowish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-I with gravel.				13.0			12.45 - 13.0				13
14					Yellowish brown	Dense	Clayey GRAVEL	Dense, Yellowish brown mottled light gray, Clayey GRAVEL.				14.0	36/30	SPT-10	13.45 - 14.0				14
15	-15.00	15.00	1.50									15.0	56/30	SPT-11	14.45 - 15.0				15
16					Light gray	Dense to very dense	Silty SAND with gravel	Dense to very dense, Light gray mottled yellowish brown, Silty SAND with gravel.				16.0			15.45 - 16.0				16
17												17.0	48/30	SPT-12	16.45 - 17.0				17
18	-16.50	16.50	3.00									18.0	38/30	SPT-13	17.45 - 18.0				18
19	-19.50	19.50	1.50		Pinkish gray	Dense	Clayey GRAVEL	Dense, Yellowish brown mottled light gray, Clayey GRAVEL.	19.50			19.0			18.45 - 19.0				19
20					Yellowish brown				2/2/16			20.0	60/21	SPT-14	19.45 - 20.0				20
21												21.0	50/10	SPT-15	20.45 - 21.0				21
22					Light gray	Very dense	Silty SAND with gravel	Very dense, Yellowish brown and Light gray, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND with gravel.	22.50			22.0			21.45 - 22.0				22
23									3/2/16			23.0	54/12	SPT-16	22.45 - 23.0				23
24												24.0	55/15	SPT-17	23.45 - 24.0				24
25	-25.50	25.50	6.00						25.50			25.0	52/10	SPT-18	24.45 - 25.0				25
26									4/2/16			26.0			25.45 - 26.0				26
27										27.0 φ110		27.0	53/19	SPT-19	26.45 - 27.0				27
28					Yellowish brown	Very dense	Silty SAND-II	Very dense, Yellowish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-II with trace of gravel.				28.0			27.45 - 28.0				28
29								Depth 1.00 ~ 6.00 m - (Residual soil)				29.0	54/11	SPT-20	28.45 - 29.0				29
30	-30.45	30.45	4.95					Depth 6.00 ~ 30.45 m - (Completely weathered GRANITE)	30.45			30.0	51/15	SPT-21	29.45 - 30.0				30
									5/2/16						30.45				

NOTES

Relative density description		Consistency description	
Relative density	SPT N-Value (mean)	Consistency	SPT N-Value (mean)
Very loose	0 - 4	Very soft	under 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very dense	over 50	Very stiff	16 - 30
		Hard	over 30

Sample key

- P-1 Disturbed sample (SPT sample)
- T-1 Undisturbed Sample (Piston sampler)
- D-1 Undisturbed Sample (Denison sampler)
- Rock core sample (Single core tube)
- Rock core sample (Double core tube)
- Rock core sample (Core lost)
- W-1 Water sample

RQD (%)	Term
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Planner structure

Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Discontinuities

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

Remarks

Geo-friends Engineering & construction Co.,Ltd.
Tel : 951-561431, 959-420107757
www.geo-friends.com
service@geo-friends.com

Revision No.	Rev-0
Revision Date	03/03/16
Site Geologist : Zaw Htet	
Operator : Win Shwe	
Checked by : May Thu	

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Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-4**
Total Depth : 30.26 m

Coordinate : N 14° 04' 42.2" E 98° 12' 11.6"
Reduced Level : Existing GL
Drill Started : 1.2.2016
Drill Finished : 6.2.2016
Logged By : Zaw Htet

Page : 1 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 27 m

Depth of Daily Groundwater Level

1.2.2016 - 1.00 m (Evening)
2.2.2016 - 0.94 m (Morning)
2.2.2016 - 6.02 m (Evening)
3.2.2016 - 6.42 m (Morning)
3.2.2016 - 6.02 m (Evening)

Elevation (MSL) / Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% 2 4 6 8 10	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
0								D - 1 (0 - 1.0 m)		1.00 m		Top soil layered
1												
2	▼			11/30cm	3	4	7	SPT - 1 (1.00 - 1.45 m)	11	1.00 m	==....	Medium dense Reddish brown High plasticity **Clayey SAND** (Residual soil)
3	▼			13/30cm	5	6	7	SPT - 2 (2.00 - 2.45 m)	13	1.00 m	==....	Medium dense Reddish brown mottled yellowish brown **Clayey SAND** (Residual soil)
4	▨			Rec: 25/30cm				UD - 1 (3.00 - 3.25 m)		1.00 m	==....	Reddish brown mottled yellowish brown Low plasticity **Clayey SAND** with traces of gravel (Residual soil) UD-1 (UCS=363.42, Pc=172.56, Cc=0.065)
5	▼			14/30cm	7	7	7	SPT - 3 (4.00 - 4.50 m)	14	1.00 m	==....	Medium dense Yellowish brown mottled light gray High plasticity **Clayey SAND** (Residual soil)
6	▼			7/30cm	2	2	5	SPT - 4 (5.00 - 5.45 m)	7	1.00 m	xx...	Loose Light gray mottled yellowish brown Fine to medium grained sand **Silty SAND** (Residual soil)
7	▼			17/30cm	5	7	10	SPT - 5 (6.00 - 6.45 m)	17	1.50 m	==....	Medium dense Yellowish brown mottled light gray Fine to medium grained sand **Clayey SAND** with gravel (Completely weathered GRANITE)
8	▼			13/30cm	3	6	7	SPT - 6 (7.50 - 7.95 m)	13	1.50 m	xx...	Medium dense Reddish brown Fine to coarse grained sand Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
9												
10	▼			24/30cm	9	11	13	SPT- 7 (9.00 - 9.45 m)	24		xx...	Medium dense Reddish brown mottled yellowish brown Fine to medium grained sand **Silty SAND** with gravel (Completely weathered GRANITE)

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Page : 2 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 27 m

Depth of Daily Groundwater Level

4.2.2016 - 5.63 m (Morning)
4.2.2016 - 6.04 m (Evening)
5.2.2016 - 5.37 m (Morning)
5.2.2016 - 6.42 m (Evening)
6.2.2016 - 5.48 m (Morning)
6.2.2016 - 5.42 m (Evening)

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% 2 4 6 8 10	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	10										1.50 m	...xx	
	11	▼			13/30cm	1	5	8	SPT - 8 (10.50 - 10.95 m)	13		==....	Medium dense Reddish brown mottled light gray Fine to medium grained sand **Clayey SAND** with gravel (Completely weathered GRANITE)
	12										1.50 m	==....	
	13	▼			35/30cm	14	16	19	SPT - 9 (12.00 - 12.45 m)	35	1.50 m	xx...	Dense Yellowish brown Fine to coarse grained Subrounded to subangular shaped **Silty SAND** with gravel (Completely weathered GRANITE)
	14	▼			36/30cm	14	18	18	SPT - 10 (13.50 - 13.95 m)	36		==oo	Dense Yellowish brown mottled light gray Fine to coarse grained **Clayey GRAVEL** (Completely weathered GRANITE)
	15										1.50 m	==oo	
	16	▼			56/30cm	5	19	37	SPT - 11 (15.00 - 15.45 m)	56	1.50 m	xx....	Very dense Light gray mottled yellowish brown Fine to coarse grained **Silty SAND** with gravel (Completely weathered GRANITE)
	17	▼			48/30cm	25/13cm	33	15	SPT - 12 (16.50 - 16.93 m)	48		xx....	Dense Reddish gray Fine to coarse grained **Silty SAND** with gravel (Completely weathered GRANITE)
	18	▼			38/30cm	14	19	19	SPT - 13 (18.00 - 18.45 m)	38		xx....	
	19										3.00 m	xx....	
	20	▼			60/21cm	25	38	22/6cm	SPT - 14 (19.50 - 19.86 m)	60		xx....	

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Angle from Vertical : 90 degree
Depth of Casing : 27 m

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	20												Very dense Yellowish brown Fine to coarse grained sand Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	21	▼			50/10cm	25/ 9cm	50/ 10cm	-	SPT -15 (21.00 - 21.19 m)	50	1.50 m		
	22												Very dense Dark gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	23	▼			54/12cm	25/ 7cm	54/ 12cm	-	SPT - 16 (22.50 - 22.69 m)	54	1.50 m		Very dense Light gray Fine to coarse grained Subrounded to subangular **Clayey SAND** with gravel (Completely weathered GRANITE)
	24	▼			55/15cm	25/ 4cm	55	-	SPT - 17 (24.00 - 24.19 m)	55	1.50 m		Very dense Light gray Fine to coarse grained Subrounded to subangular **Silty GRAVEL** with sand (Completely weathered GRANITE)
	25												
	26	▼			52/10cm	25/ 10cm	52/ 10cm	-	SPT - 18 (25.50 - 25.65 m)	52			Very dense Yellowish brown Fine to coarse grained **Silty SAND** (Completely weathered GRANITE)
	27	▼			53/19cm	8	40	13/ 4 cm	SPT -19 (27.00 - 27.34 m)	53	3.00 m		
	28												
	29	▼			54/11cm	16	54/ 11cm	-	SPT -20 (28.50 - 28.76 m)	54			Very dense Yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	30												

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-4**
Total Depth : 30.26 m

Coordinate : N 14° 04' 42.2"
E 98° 12' 11.6"
Reduced Level : Existing GL
Drill Started : 1.2.2016
Drill Finished : 6.2.2016
Logged By : Zaw Htet

Page : 4 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 27 m

Elevation (MSL) / Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION (X 10%)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	Depth of Daily Groundwater Level
30				51/15cm	25/ 11cm	51	-	SPT - 21 (30.00 - 30.26 m)	51	0.26 m	xx... xx... xx... xx... xx...	Very dense Yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												

Borehole terminated at 30.26 m BGL.

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
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Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

BH-5

BORE HOLE No. **BH - 5**

B O R I N G L O G (FOR DESIGN PARAMETERS CONSIDERATION)

Sheet No. 1 OF 1

PROJECT NAME : Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

LOCATION : In the compound of Dawei General Hospital, Dawei

GROUND LEVEL : Existing Ground Level

COORDINATE : N : 14° 04' 42.8", E : 98°12' 09.7" DEPTH : 30.45 m

BORING EQUIPMENT : TOHO (CD-6) DATE : 6/2/16 ~ 10/2/16

BORING METHOD : Rotary Drilling Method LOGGED BY : Nyi Nyi Htut

ORIENTATION : Vertical

GROUND WATER LEVEL : 4.90 m

CLIENT: Yamashita Sekkei Inc.

SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)
1	-1.00	1.00	1.00				Sandy CLAY	Top soil layer, Backfilled soil, Sandy CLAY.			
2					Reddish brown						
3											
4											
5									5.00 7/2/16		4.90
6					Light gray	Loose to dense	Clayey SAND	Loose to dense, Light gray mottled reddish and yellowish brown, pinkish gray, Fine to coarse grained sand, Clayey SAND with trace of gravel.			
7											
8											
9					Yellowish brown						
10											
11											
12					Pinkish gray						
13											
14											
15	-15.00	15.00	14.00								
16					Yellowish brown	Medium dense	Silty SAND-I	Medium dense, Light gray and yellowish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-I with gravel.			
17					Light gray						
18	-18.00	18.00	3.00								
19					Light gray	Very dense	Silty SAND-II	Very dense, Light gray mottled yellowish and reddish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-II with gravel.	19.50 8/2/16		
20											
21											
22									22.50 9/2/16		
23											
24											
25											
26											
27										27.0 ϕ110	
28											
29											
30	-30.45	30.45	12.45						30.45 10/2/16		

Depth 1.00 ~ 5.00 m - (Residual soil)

Depth 5.00 ~ 30.45 m - (Completely weathered GRANITE)

STANDARD PENETRATION TEST
TEST METHOD (ASTM D 1586-99)

SAMPLING

DEPTH GL - (m)	N-Value (Blows / 30cm)	SAMPLE (Type & No.)	DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%)
1.0	7/30	SPT-1	0.45 1.0 1.45			
2.0	10/30	SPT-2	2.0 2.45			
3.0	40/50	UD-1	3.0 3.45			
4.0	10/30	SPT-3	4.0 4.45			
5.0	13/30	SPT-4	5.0 5.45			
6.0	15/30	SPT-5	6.0 6.45			
7.0	16/30	SPT-6	7.0 7.45			
8.0	13/30	SPT-7	8.0 8.45 9.0 9.45			
9.0	39/30	SPT-8	10.0 10.45 11.0 11.45			
10.0	20/30	SPT-9	12.0 12.45			
11.0	14/30	SPT-10	13.0 13.45 14.0 14.45			
12.0	21/30	SPT-11	15.0 15.45			
13.0	26/30	SPT-12	16.0 16.45 17.0 17.45			
14.0	55/22	SPT-13	18.0 18.45			
15.0	50/30	SPT-14	19.0 19.45 20.0 20.45			
16.0	53/18	SPT-15	21.0 21.45 22.0			
17.0	52/5	SPT-16	22.45 23.0 23.45			
18.0	53/11	SPT-17	24.0 24.45			
19.0	54/7	SPT-18	25.0 25.45 26.0 26.45			
20.0	51/9	SPT-19	27.0 27.45			
21.0	50/8	SPT-20	28.0 28.45 29.0 29.45			
22.0	54/7	SPT-21	30.0 30.45			

CURVE OF BLOW ●
N-Value (Blows / 30cm)
0 20 40 60 80 100

NOTES

Relative density description		Consistency description	
Relative density	SPT N-Value (meas)	Consistency	SPT N-Value (meas)
Very loose	0 - 4	Very soft	under 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very dense	over 50	Very stiff	16 - 30
		Hard	over 30

Sample key

- P-1 Disturbed sample (SPT sample)
- T-1 Undisturbed Sample (Piston sampler)
- D-1 Undisturbed Sample (Denison sampler)
- Rock core sample (Single core tube)
- Rock core sample (Double core tube)
- Rock core sample (Core lost)
- W-1 Water sample

RQD (%)	Term
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Planner structure

Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Discontinuities

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

Remarks

Geo-friends Engineering & construction Co.,Ltd.
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www.geo-friends.com
service@geo-friends.com

Revision No.	Rev-0
Revision Date	03/03/16
Site Geologist	: Nyi Nyi Htut
Operator	: Hla Min Htut
Checked by	: May Thu

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-5**
Total Depth : 30.17 m

Coordinate : N 14° 04' 42.8" E 98° 12' 9.7"
Reduced Level : Existing GL
Drill Started : 6.2.2016
Drill Finished : 10.2.2016
Logged By : Nyi Nyi Htut

Page : 1 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 27 m

Depth of Daily Groundwater Level

7.2.2016 - 1.0 m (Evening)
8.2.2016 - 3.3 m (Morning)
8.2.2016 - 3.9 m (Evening)
9.2.2016 - 4.9 m (Morning)
9.2.2016 - 5.5 m (Evening)

Elevation (MSL) / Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% 2 4 6 8 10	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
0								D - 1 (0 - 1.0 m)		1.00 m		Top soil layered **Sandy CLAY** **(Back filled soil)**
1				7/30cm	2	3	4	SPT - 1 (1.00 - 1.45 m)	7	1.00 m		Firm Reddish brown Low plasticity **Sandy Lean CLAY** (Residual soil)
2				10/30cm	3	5	5	SPT - 2 (2.00 - 2.45 m)	10	2.00 m		Loose Reddish brown mottled gray Low plasticity **Clayey SAND** with gravel (Residual soil)
3				Rec: 40/50cm				UD - 1 (3.00 - 3.50 m)				UD-1 (Cuu=24.86, ϕuu=37.00)
4				10/30cm	4	5	5	SPT - 3 (4.00 - 4.45 m)	10	1.00 m		Loose Reddish brown mottled gray Low plasticity **Clayey SAND** (Residual soil)
5				13/30cm	6	6	7	SPT - 4 (5.00 - 5.45 m)	13	1.00 m		Medium dense Light gray mottled yellowish brown spotte reddish brown Fine to medium grained sand Low plasticity **Clayey SAND** (Completely weathered GRANITE)
6				15/30cm	6	7	8	SPT - 5 (6.00 - 6.45 m)	15	3.00 m		Medium dense Light gray mottled yellowish brown Fine to coarse grained sand Subrounded to subangular **Clayey SAND** (Completely weathered GRANITE)
7				16/30cm	5	7	9	SPT - 6 (7.50 - 7.95 m)	16			
8				13/30cm	4	5	8	SPT- 7 (9.00 - 9.45 m)	13			Medium dense Yellowish brown mottled gray Fine to coarse grained sand Low plasticity Subrounded to subangular **Clayey SAND** (Completely weathered GRANITE)
9												
10												

R.Q.D
<25% = Very Poor Rock
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50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
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4 = Highly Weathered Rock
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6 = Residual Soil

Degree of Hardness
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Average Length of Core Pieces
1 = Average length of core pieces >50cm
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5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-5**
Total Depth : 30.17 m

Coordinate : N 14° 04' 42.8"
E 98° 12' 9.7"
Reduced Level : Existing GL
Drill Started : 6.2.2016
Drill Finished : 10.2.2016
Logged By : Nyi Nyi Htut

Page : 2 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 27 m

Depth of Daily Groundwater Level

10.2.2016 - 4.6 m (Morning)
10.2.2016 - 5.8 m (Evening)

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	10										1.50 m		
	11				39/30cm	9	17	22	SPT - 8 (10.50 - 10.95 m)	39			Dense Yellowish brown mottled gray Fine to coarse grained sand Subrounded to subangular **Clayey SAND** with gravel (Completely weathered GRANITE)
	12										1.50 m		
	13				20/30cm	6	9	11	SPT - 9 (12.00 - 12.45 m)	20			Medium dense Pinkish gray mottled yellowish brown Fine to coarse grained sand Low plasticity Subrounded to subangular **Clayey SAND** with gravel (Completely weathered GRANITE)
	14				14/30cm	2	7	7	SPT - 10 (13.50 - 13.95 m)	14			
	15										3.00 m		
	16				21/30cm	9	10	11	SPT - 11 (15.00 - 15.45 m)	21			Medium dense Yellowish brown mottled gray Fine to coarse grained sand Subrounded to subangular shape **Silty SAND** with gravel (Completely weathered GRANITE)
	17				26/30cm	6	15	11	SPT - 12 (16.50 - 16.93 m)	26			Medium dense Light gray mottled reddish brown Fine to coarse grained sand Subrounded to subangular shape **Silty SAND** with gravel (Completely weathered GRANITE)
	18										1.50 m		
	19				55/22cm	21	29	26/ 7cm	SPT - 13 (18.00 - 18.37 m)	55			Very dense Reddish brown mottled gray Fine to coarse grained sand Subrounded to subangular shape **Silty SAND** with gravel (Completely weathered GRANITE)
	20				50/30cm	22	29	21	SPT - 14 (19.50 - 19.95 m)	50	1.50 m		

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50-75% = Fair Rock
75-90% = Good Rock
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Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
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Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
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Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-5**
Total Depth : 30.17 m

Coordinate : N 14° 04' 42.8" E 98° 12' 9.7"
Reduced Level : Existing GL
Drill Started : 6.2.2016
Drill Finished : 10.2.2016
Logged By : Nyi Nyi Htut

Page : 3 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 27 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION (X 10%, 2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	Depth of Daily Groundwater Level
	20											xx...	Dense Light gray mottled brownish gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	21	▼			53/18cm	24	43	10/3cm	SPT -15 (21.00 - 21.33 m)	53	1.50 m	xx...	
	22										1.50 m	xx...	Very dense Yellowish brown mottled gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	23	▼			52/5cm	22	52/5cm	-	SPT - 16 (22.50 - 22.70 m)	52	1.50 m	xx...	Very dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	24											xx...	
	25	▼			53/11cm	24	53/11cm	-	SPT - 17 (24.00 - 24.26 m)	53	1.50 m	xx...	Very dense Yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	26	▼			54/7cm	25	54/7cm	-	SPT - 18 (25.50 - 25.72 m)	54	1.50 m	xx...	Very dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	27											xx...	
	28	▼			51/9cm	22	51/9 cm	-	SPT -19 (27.00 - 27.24 m)	51	1.50 m	xx...	Very dense Light gray mottled yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	29	▼			50/8cm	25/10cm	50/8cm	-	SPT -20 (28.50 - 28.68 m)	50	1.50 m	xx...	Very dense Yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	30											xx...	

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1 = Average length of core pieces >50cm
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4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar Project

Client: Yamashita Sekkei Inc.
Location : In the Compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No: **BH-5**
Total Depth : 30.17 m

Coordinate : N 14° 04' 42.8"
E 98° 12' 9.7"
Reduced Level : Existing GL
Drill Started : 6.2.2016
Drill Finished : 10.2.2016
Logged By : Nyi Nyi Htut

Page : 4 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 27 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	Depth of Daily Groundwater Level
	30				54/7cm	25/ 10cm	54/ 7cm	-	SPT - 21 (30.00 - 30.17 m)	54	0.17 m	xx... xx... xx... xx... xx...	Very dense Yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	31												
	32												
	33												
	34												
	35												
	36												
	37												
	38												
	39												
	40												

Borehole terminated at 30.17 m BGL.

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
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1 = Very soft Rock
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Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

BH-6

BORE HOLE No. **BH - 6**

B O R I N G L O G (FOR DESIGN PARAMETERS CONSIDERATION)

Sheet No. 1 OF 1

PROJECT NAME : Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

LOCATION : In the compound of Dawei General Hospital, Dawei

GROUND LEVEL : Existing Ground Level

COORDINATE : N : 14° 04' 41.9", E : 98°12' 10.3" DEPTH : 30.45 m

BORING EQUIPMENT : YWE (CD-1) DATE : 8/2/16 ~ 11/2/16

BORING METHOD : Rotary Drilling Method LOGGED BY : Zaw Htet

ORIENTATION : Vertical

GROUND WATER LEVEL : 5.60 m

CLIENT

Yamashita Sekkei Inc.

SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM D 1586-99) DEPTH GL - (m)	N-Value (Blows / 30cm)	CURVE OF BLOW N-Value (Blows / 30cm) 0 20 40 60 80 100	SAMPLING SAMPLE (Type & No.)	SAMPLING DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%)	SCALE (m)
1	-1.00	1.00	1.00					Top soil layer.				1.0	8/30		SPT-1	0.45 / 1.0 / 1.45				1
2												2.0	30/50		UD-1	2.0 / 2.45				2
3												3.0	30/40		UD-2	3.0 / 3.45				3
4												4.0	13/30		SPT-2	4.0 / 4.45				4
5												5.0	11/30		SPT-3	5.0 / 5.45				5
6					Reddish brown	Loose to medium dense	Clayey SAND	Loose to medium dense, Reddish brown mottled light gray, Low plasticity, Clayey SAND with trace of gravel.			5.60	6.0	12/30		SPT-4	6.0 / 6.45				6
7												7.0				7.0 / 7.45				7
8												8.0	26/30		SPT-5	8.0 / 8.45				8
9												9.0	20/30		SPT-6	9.0 / 9.45				9
10	-10.50	10.50	9.50									10.0				10.0 / 10.45				10
11					Yellowish brown							11.0	28/30		SPT-7	11.0 / 11.45				11
12									12.00			12.0	37/30		SPT-8	12.0 / 12.45				12
13					Light gray	Medium dense to dense	Clayey SAND with gravel	Medium dense to dense, Yellowish brown and light gray, Fine to coarse grained sand, Clayey SAND with gravel.	8/2/16			13.0				13.0 / 13.45				13
14												14.0	42/30		SPT-9	14.0 / 14.45				14
15	-15.00	15.00	4.50									15.0	14/30		SPT-10	15.0 / 15.45				15
16					Reddish brown							16.0				16.0 / 16.45				16
17					Light gray							17.0	11/30		SPT-11	17.0 / 17.45				17
18						Medium dense to dense	Clayey SAND	Medium dense to dense, Reddish brown mottled light gray, Low plasticity, Clayey SAND with trace of gravel.				18.0	19/30		SPT-12	18.0 / 18.45				18
19					Yellowish brown							19.0				19.0 / 19.45				19
20												20.0	44/30		SPT-13	20.0 / 20.45				20
21	-21.00	21.00	6.00									21.0	52/9		SPT-14	21.0 / 21.45				21
22					Yellowish brown							22.0				22.0 / 22.45				22
23					Light gray				22.50			23.0	52/8		SPT-15	23.0 / 23.45				23
24									9/2/16			24.0	54/6		SPT-16	24.0 / 24.45				24
25												25.0				25.0 / 25.45				25
26					Yellowish brown	Very dense	Silty SAND-II	Very dense, Light gray and yellowish brown, Fine to coarse grained sand, Sub-rounded to sub-angular, Silty SAND-II with trace of gravel.		26.0 ϕ110		26.0	54/13		SPT-17	26.0 / 26.45				26
27												27.0	54/25		SPT-18	27.0 / 27.45				27
28					Light gray			Depth 1.00 ~ 5.00 m - (Residual soil)	28.50			28.0				28.0 / 28.45				28
29								Depth 5.00 ~ 30.45 m - (Completely weathered GRANITE)	10/2/16			29.0	54/11		SPT-19	29.0 / 29.45				29
30	-30.45	30.45	9.45						30.45			30.0	54/10		SPT-20	30.0 / 30.45				30
									11/2/16											

NOTES

Relative density description		Consistency description	
Relative density	SPT N-Value (meas)	Consistency	SPT N-Value (meas)
Very loose	0 - 4	Very soft	under 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very dense	over 50	Very stiff	16 - 30
		Hard	over 30

Sample key

- P-1 Disturbed sample (SPT sample)
- T-1 Undisturbed Sample (Piston sampler)
- D-1 Undisturbed Sample (Denison sampler)
- Rock core sample (Single core tube)
- Rock core sample (Double core tube)
- Rock core sample (Core lost)
- W-1 Water sample

RQD (%)	Term
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Planner structure

Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Discontinuities

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

Remarks

Geo-friends Engineering & construction Co.,Ltd.

Tel : 951-561431, 959-420107757
www.geo-friends.com
service@geo-friends.com

Revision No.	Rev-0
Revision Date	03/03/16
Site Geologist : Zaw Htet	
Operator : Win Shwe	
Checked by : May Thu	

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-6**
Total Depth : 30.18 m

Co-ordinate : N 14° 04' 41.9″
E 98° 12' 10.3″
Reduced Level : Existing ground level
Drill Started : 8.2.2016
Drill Finished : 11.2.2016
Logged By : Zaw Htet

Page : 1 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 15 m

Depth of Daily Groundwater Level

8.2.2016 - 8.48 m (Evening)
9.2.2016 - 2.14 m (Morning)
9.2.2016 - 4.26 m (Evening)
10.2.2016 - 6.42 m (Morning)
10.2.2016 - 6.54 m (Evening)

Elevation (MSL) / Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
0								D - 1 (0.00 - 1.50 m)		1.00 m		Top soil layer
1												
2	▼			8/30cm	3	4	4	SPT - 1 (1.00 - 1.45 m)	8	1.00 m	====	Firm Reddish brown Low plasticity **Lean CLAY** (Residual soil)
3	▨			Rec: 30/30cm				UD - 1 (2.00 - 2.30 m)		1.00 m	...	Reddish brown Low plasticity **Clayey SAND** with traces of gravel (Residual soil) UD-1 (UCS=116.03, Pc=339.85, Cc=0.105)
4	▨			Rec: 30/40cm				UD - 2 (3.00 - 3.40 m)		2.00 m	...	Medium dense Yellowish brown mottled light gray Low plasticity **Clayey SAND** (Residual soil) UD-2 (UCS=350.73)
5	▼			13/30cm	6	6	7	SPT- 2 (4.00 - 4.45 m)	13		...	
6	▼			11/30cm	2	4	7	SPT - 3 (5.00 - 5.45 m)	11	3.00 m	...	Medium dense Reddish brown mottled light gray Low plasticity **Clayey SAND** with traces of gravel (Completely weathered GRANITE)
7	▼			12/30cm	2	4	8	SPT - 4 (6.00 - 6.45 m)	12		...	
8	▼			26/30cm	10	11	15	SPT - 5 (7.50 - 7.95 m)	26		...	Medium dense Reddish brown mottled light gray Low plasticity **Clayey SAND** (Completely weathered GRANITE)
9											...	
10	▼			20/30cm	6	9	11	SPT - 6 (9.00 - 9.45 m)	20		...	

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
5 = Completely Weathered Rock
6 = Residual Soil

Degree of Hardness
1 = Very soft Rock
2 = Soft Rock
3 = Medium Hard Rock
4 = Hard Rock
5 = Very Hard Rock

Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-6**
Total Depth : 30.18 m

Co-ordinate : N 14° 04' 41.9″
E 98° 12' 10.3″
Reduced Level : Existing ground level
Drill Started : 8.2.2016
Drill Finished : 11.2.2016
Logged By : Zaw Htet

Page : 2 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 15 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	Depth of Daily Groundwater Level / Description
	10										3.00 m		
	11	▼			28/30cm	9	14	14	SPT - 7 (10.50 - 10.95 m)	28	1.50 m		Medium dense Yellowish brown Fine to coarse grained Subrounded to subangular **Clayey SAND** with gravel (Completely weathered GRANITE)
	12												
	13	▼			37/30cm	11	15	22	SPT - 8 (12.00 - 12.45 m)	37	1.50 m		Medium dense Light gray mottled yellowish brown Fine to coarse grained **Clayey SAND** with gravel (Completely weathered GRANITE)
	14	▼			42/30cm	12	25	17	SPT - 9 (13.50 - 13.95 m)	42	1.50 m		Dense Light pinkish gray Fine to coarse grained sand **Clayey SAND** with gravel (Completely weathered GRANITE)
	15												
	16	▼			14/30cm	3	5	9	SPT- 10 (15.00 - 15.45 m)	14	1.50 m		Medium dense Reddish brown mottled light gray Low plasticity **Clayey SAND** (Completely weathered GRANITE)
	17	▼			11/23cm	5	4	7	SPT - 11 (16.50 - 16.95 m)	11	1.50 m		Medium dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	18												
	19	▼			19/30cm	11	9	10	SPT - 12 (18.00 - 18.45 m)	19	1.50 m		Medium dense Yellowish brown mottled light gray Fine to coarse grained **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	20	▼			44/30cm	6	19	25	SPT - 13 (19.50 - 19.95 m)	44			

Depth of Daily Groundwater Level

5.2.2016 - 3.9 m (Morning)
5.2.2016 - 5.1 m (Evening)

R.Q.D
<25% = Very Poor Rock
25-50 = Poor Rock
50-75% = Fair Rock
75-90% = Good Rock
90-100%= Very Good Rock

Degree of Weathering
1 = Fresh Rock
2 = Slightly Weathered Rock
3 = Moderately Weathered Rock
4 = Highly Weathered Rock
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Degree of Hardness
1 = Very soft Rock
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Average Length of Core Pieces
1 = Average length of core pieces >50cm
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5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-6**
Total Depth : 30.18 m

Co-ordinate : N 14° 04' 41.9″
E 98° 12' 10.3″
Reduced Level : Existing ground level
Drill Started : 8.2.2016
Drill Finished : 11.2.2016
Logged By : Zaw Htet

Page : 3 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 15 m

Depth of Daily Groundwater Level

11.2.2016 - 5.62 m (Evening)
11.2.2016 - 6.42 m (Morning)

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION (X 10%: 2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	20												
	21										1.50 m	xx...	Dense Yellowish brown mottled light gray Fine to coarse grained sand **Silty SAND** with gravel (Completely weathered GRANITE)
					52/9cm	25/ 10cm	52/ 9cm	-	SPT - 14 (21.00 - 21.19 m)	52			
	22										1.50 m		Very dense Yellowish brown mottled light gray Fine to coarse grained sand **Silty SAND** with gravel (Completely weathered GRANITE)
					52/8cm	25/ 9cm	52/ 8cm	-	SPT - 15 (22.50 - 22.67 m)	52			
	23										1.50 m		Very dense Light gray Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
	24												
					54/6cm	25/ 10cm	54/ 6cm	-	SPT - 16 (24.00 - 24.16 m)	54			
	25												Very dense Yellowish brown Fine to coarse grained Subrounded to subangular **Silty SAND** with traces of gravel (Completely weathered GRANITE)
					54/13cm	25/ 13cm	54/ 13cm	-	SPT - 17 (25.50 - 25.76 m)	54			
	26												
	27										3.00 m		
					54/25cm	25/ 13cm	41	13/ 10cm	SPT - 18 (27.00 - 27.38 m)	54			Very dense Light gray mottled Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	28												
					54/11cm	25/ 13cm	54/ 11cm	-	SPT - 19 (28.50 - 28.74 m)	54			
	29												
	30										3.00 m		

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Average Length of Core Pieces
1 = Average length of core pieces >50cm
2 = Average length of core pieces 20-50cm
3 = Average length of core pieces 5-20cm
4 = Average length of core pieces <5cm
5 = Fragmental core pieces

Symbol
Core Loss
SPT
UD

GEO-FRIENDS
Engineering & Construction Co.,Ltd.

Project: Geological Survey on the Project for Improvement of Regional General Hospitals in the Republic of the Union of Myanmar

Client : Yamashita Sekkei Inc.
Location : In the compound of Dawei General Hospital, Dawei
Province : Tanintharyi Region
Borehole No : **BH-6**
Total Depth : 30.18 m

Co-ordinate : N 14° 04' 41.9″
E 98° 12' 10.3″
Reduced Level : Existing ground level
Drill Started : 8.2.2016
Drill Finished : 11.2.2016
Logged By : Zaw Htet

Page : 4 of 4
Drilling Method : Rotary drilling method
Angle from Vertical : 90 degree
Depth of Casing : 15 m

Elevation (MSL)	Depth (m)	In-situ Test	Size of Core	Reduced Level (meter)	SPT/RQD ROCK QUALITY DESIGNATION X 10% (2 4 6 8 10)	SPT blow count 1st 15cm	2nd 15cm	3rd 15cm	Depth (m)	SPT N Value	Thickness	Log Symbol	
	30				54/10cm	25/ 8cm	54/ 10cm	-	SPT - 20 (30.00 - 30.18 m)	54	0.18 m	xx.... xx.... xx.... xx.... xx....	Very dense Light gray mottled Fine to coarse grained Subrounded to subangular **Silty SAND** with gravel (Completely weathered GRANITE)
	31												
	32												
	33												
	34												
	35												
	36												
	37												
	38												
	39												
	40												

Borehole terminated at 30.18 m BGL.

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75-90% = Good Rock
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1 = Average length of core pieces >50cm
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Symbol
Core Loss
SPT
UD

GEO-FRIENDS

Engineering and Construction Co.,Ltd.

CONSTANT DISCHARGE PUMPING OUT TEST & RECOVERY TEST RECORD

Pump Well	TW No.1	Pumping Started	10:50 AM	Project	Ground Water Survey
Well Diameter	6"	Duration for Q	2:30	Location	Dawei General Hospital, Dawei
Drilled Depth	125 feet	Discharge Rate	7719.760 L/h	Performed by	Nyi Nyi Htut
Screen Depth	57 feet	Pump Type	3 1/2-2 stroke(Submersible Pum	Date	23.03.16
Static Water Level	4.70 m	Pumping Stopped	1:30 PM		
Top of Casing	6 inch	Tank	50 gallon		

Pumped Well					
Form Pumping				For Recovery	
Time since pump started t,(min)	Depth to water level from reference point (m)	Time since pump started t,(min)	Depth to water level from reference point (m)	Time since pump stopped t,(min)	Depth to water level from reference point (m)
0	4.7			0	18
1	16.01			1	17.4
2	17.89			2	16.62
3	18.12			3	15.2
4	18.45			4	14.1
5	18.7			6	12.27
10	18.89			8	10.8
15	18.86			10	9.58
20	18.76			15	7.5
25	18.74			20	6.15
30	18.47			25	5.56
35	18.48			30	5.2
40	18.3			40	4.9
50	18.3			50	4.7
60	18.17			60	4.7
80	18.01			80	4.7
100	18.1			100	4.7
120	18.1			120	
150	18.1			150	
180				180	
210				210	
240				240	
270				270	
300				300	

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

TRACE CERTIFIED
ISO 9001:2008 Cert. No.688283

WTL-RE-001
Issue Date - 01-12-2012
Effective Date - 01-12-2012
Issue No - 1.0/Page 1 of 2

W0316 699

WATER QUALITY TEST RESULTS FORM

Client	GEO - Friends Engineering and Construction
Nature of Water	Tube Well Water (New)
Location	Dawei - Hospital
Date and Time of collection	23.3.2016
Date and Time of arrival at Laboratory	24.3.2016
Date and Time of commencing examination	25.3.2016
Date and Time of completing	27.3.2016

Results of Water Analysis			**WHO Drinking Water Guideline (Geneva - 1993)**
pH	5.6		6.5 - 8.5
Colour (True)	Nil	TCU	15 TCU
Turbidity	16	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	12	mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron	0.43	mg/l	0.3 mg/l
Chloride (as CL)	7	mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO_4)	Nil	mg/l	200 mg/l
Total Solids	38	mg/l	1500 mg/l
Suspended Solids		mg/l	
Dissolved Solids		mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by
Signature: Hein
Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr. Chemist
ISO TECH Laboratory

Approved by
Signature:
Name: Win Myint
~~B.E (Civil) 1980, M.MES~~
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)
No.18, Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
Ph: 01-640955, 09-73225175, 09-73242162, Fax: 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

WTL-RE-001
Issue Date - 01-12-2012
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Issue No - 1.0/Page 2 of 2

W0316 699

WATER QUALITY TEST RESULTS FORM

Client	GEO - Friends Engineering and Construction
Nature of Water	Tube Well Water (New)
Location	Dawei - Hospital
Date and Time of collection	23.3.2016
Date and Time of arrival at Laboratory	24.3.2016
Date and Time of commencing examination	25.3.2016
Date and Time of completing	27.3.2016

Results of Water Analysis			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Fluoride (F)	Nil	mg/l	1.5 mg/l
Lead (as Pb)	Nil	mg/l	0.01 mg/l
Arsenic (As)	Nil	mg/l	0.01 mg/l
Nitrate ($N.NO_3$)	0.2	mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia (NH_3)		mg/l	
Ammonium (NH_4)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)		mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)		mg/l	
Cyanide (CN)	Nil	mg/l	0.07 mg/l
Zinc (Zn)	0.5	mg/l	3 mg/l
Copper (Cu)	0.5	mg/l	2 mg/l
Silica (Si)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature:

Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr. Chemist
ISO TECH Laboratory

Approved by

Signature:

Name: Win Myint (M.Eng)
B.E (Civil) 1980, M.MES
Technical Officer
ISO TECH Laboratory

(a division of WEG Co.,Ltd.)
No.18, Lanthit Road, Nanthargone Quarter, Insein Township, Yangon, Myanmar.
Ph: 01-640955, 09-73225175, 09-73242162, Fax: 01-644506, E-mail: isotechlaboratory@gmail.com, Website: weg-myanmar.com

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
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TRACE CERTIFIED

ISO 9001:2008 Cert. No.688283

W0316 762

WATER QUALITY TEST RESULTS FORM

Client	GEO - Friend
Nature of Water	Tube Well Water
Location	Dawei Hospital
Date and Time of collection	23.3.2016
Date and Time of arrival at Laboratory	26.3.2016
Date and Time of commencing examination	28.3.2016
Date and Time of completing	30.3.2016

Results of Water Analysis			WHO Drinking Water Guideline (Geneva - 1993)
pH	5.4		6.5 - 8.5
Colour (True)	Nil	TCU	15 TCU
Turbidity	1	NTU	5 NTU
Conductivity		micro S/cm	
Total Hardness	24	mg/l as $CaCO_3$	500 mg/l as $CaCO_3$
Calcium Hardness		mg/l as $CaCO_3$	
Magnesium Hardness		mg/l as $CaCO_3$	
Total Alkalinity		mg/l as $CaCO_3$	
Phenolphthalein Alkalinity		mg/l as $CaCO_3$	
Carbonate ($CaCO_3$)		mg/l as $CaCO_3$	
Bicarbonate (HCO_3)		mg/l as $CaCO_3$	
Iron	0.12	mg/l	0.3 mg/l
Chloride (as CL)	12	mg/l	250 mg/l
Sodium chloride (as NaCL)		mg/l	
Sulphate (as SO_4)	Nil	mg/l	200 mg/l
Total Solids		mg/l	1500 mg/l
Suspended Solids		mg/l	
Dissolved Solids	39	mg/l	1000 mg/l
Manganese	Nil	mg/l	0.05 mg/l
Phosphate		mg/l	
Phenolphthalein Acidity		mg/l	
Methyl Orange Acidity		mg/l	
Salinity		ppt	

Remark: This certificate is issued only for the receipt of the test sample.

Tested by

Signature:

Name: Zaw Hein Oo
B.Sc (Chemistry)
Sr. Chemist
ISO TECH Laboratory

Approved by

Signature:

Name: Soe Thit
B.E (Civil) 1980
Technical Officer
ISO TECH Laboratory

ISO TECH LABORATORY

Laboratory Technical Consultant: U Saw Christopher Maung
B.Sc Engg: (Civil), Dip S.E (Delft) Lecturer of YIT (Retd), Consultant (Y.C.D.C), LWSE 001.
Former Member (UNICEF, Water quality monitoring & Surveillance Myanmar)

TRACE CERTIFIED

ISO 9001:2008 Cert. No.688283

W0316 762

WATER QUALITY TEST RESULTS FORM

Client	GEO - Friend
Nature of Water	Tube Well Water
Location	Dawei Hospital
Date and Time of collection	23.3.2016
Date and Time of arrival at Laboratory	26.3.2016
Date and Time of commencing examination	28.3.2016
Date and Time of completing	30.3.2016

Results of Water Analysis			WHO Drinking Water Guideline (Geneva - 1993)
Temperature (°C)		°C	
Fluoride (F)	0.5	mg/l	1.5 mg/l
Lead (as Pb)	Nil	mg/l	0.01 mg/l
Arsenic (As)	Nil	mg/l	0.01 mg/l
Nitrate ($N.NO_3$)	0.1	mg/l	50 mg/l
Chlorine (Residual)		mg/l	
Ammonia (NH_3)		mg/l	
Ammonium (NH_4)		mg/l	
Dissolved Oxygen (DO)		mg/l	
Chemical Oxygen Demand (COD)		mg/l	
Biochemical Oxygen Demand (BOD) (5 days at 20 °C)		mg/l	
Cyanide (CN)	Nil	mg/l	0.07 mg/l
Zinc (Zn)	Nil	mg/l	3 mg/l
Copper (Cu)	Nil	mg/l	2 mg/l
Silica (Si)		mg/l	

Remark: This certificate is issued only for the receipt of the test sample.

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7－4　EQUIPMENT LIST FOR DAWEI GENERAL HOSPITAL

ID No.	Name	Total No.	Outpatient Department	Diagnostic Imaging Department	Operation Theater Complex
1	Operation lamp　A（dual lamp type, for major surgery）	4			4
2	Operation lamp　B（single lamp type, for minor surgery）	2			2
3	CT Scanner	1		1	
4	Dental unit	2	2		
5	ENT unit	1	1		
6	Fluoroscopy X-ray machine	1		1	
7	General X-ray machine	1		1	
8	Hand scrub station	3			3
9	High pressure steam sterilizer L	1			1
10	High pressure steam sterilizer M	1			1
11	MRI unit	1		1	
12	Warm cabinet	1			1
13	Film viewer　(for one film)	10	10		
14	Film viewer　(for two films)	4			4